JULY 16, 1938

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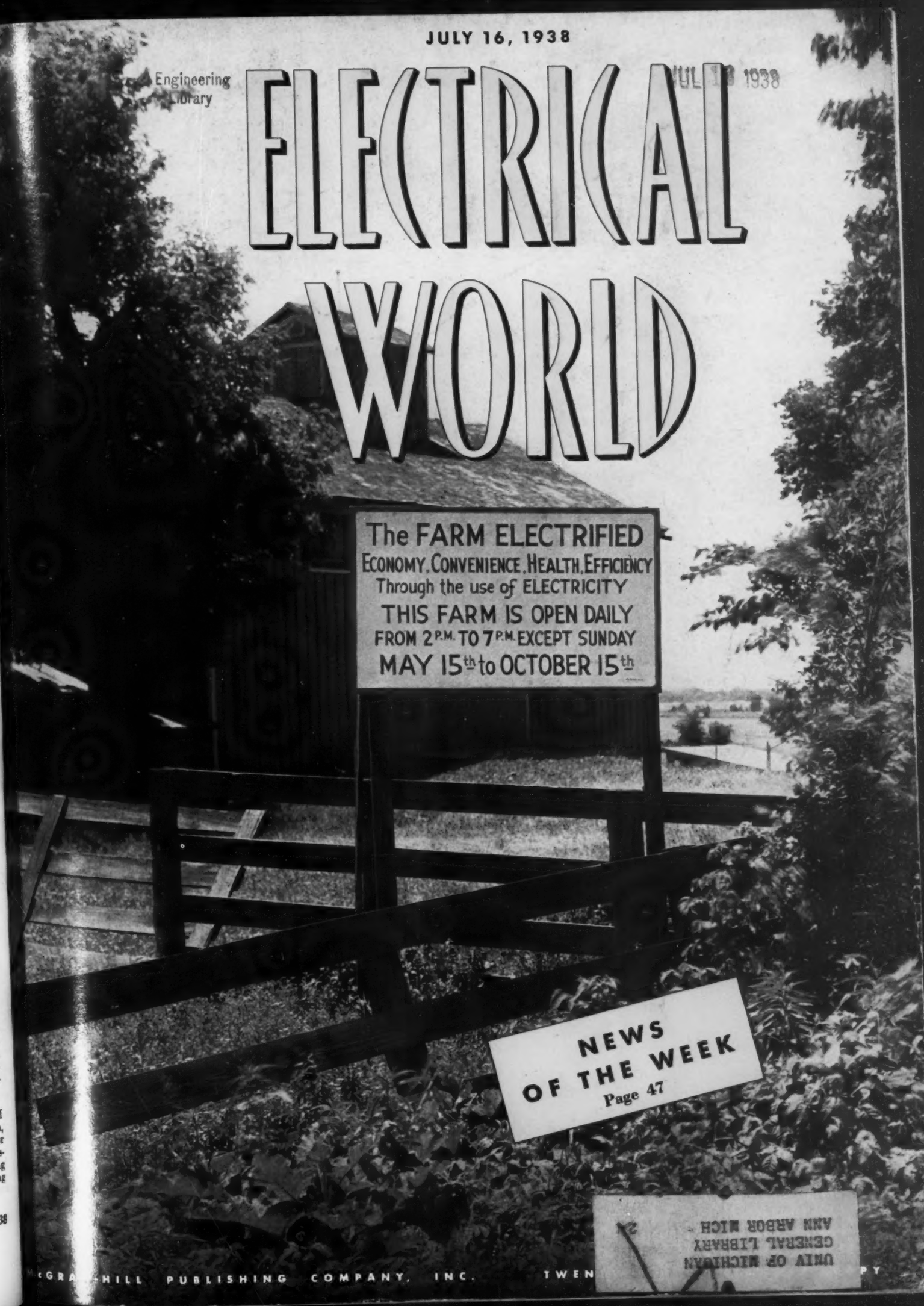
JUL 1938

ELECTRICAL WORLD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NEWS OF THE WEEK
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ELECTRICAL WORLD

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Coming Features

Lighting Issue

Case studies of successful utility lighting programs will be presented in the annual lighting issue, scheduled for July 30. What was done, why it was done, what specific results were obtained and what it cost to get those results will be told. All branches of lighting will be considered.

Power Plants

Power plant revamping, aimed at conserving investment and promoting efficiency, included rebuilding a turbine, adding another, remodeling reheaters, using gas for fuel, modernizing pulverizers and converting breakers. J. A. Keeth, Kansas City Power & Light, tells about it in an early issue.

Transmission

Directing their efforts toward safety and accessibility, Stone & Webster engineers designed sightly parabolic towers with platforms for air-travel lighting and for maintenance of insulators for a 132-kv. river crossing.

Industrial Distribution

Industrial electrical engineers should be interested in an account of the modern power distribution system installed by a modern aircraft plant to facilitate production flexibility.

On the Cover

Completely electrified farm used by Public Service of Northern Illinois as a medium for demonstrating—and selling—farm service. Story begins on page 34.

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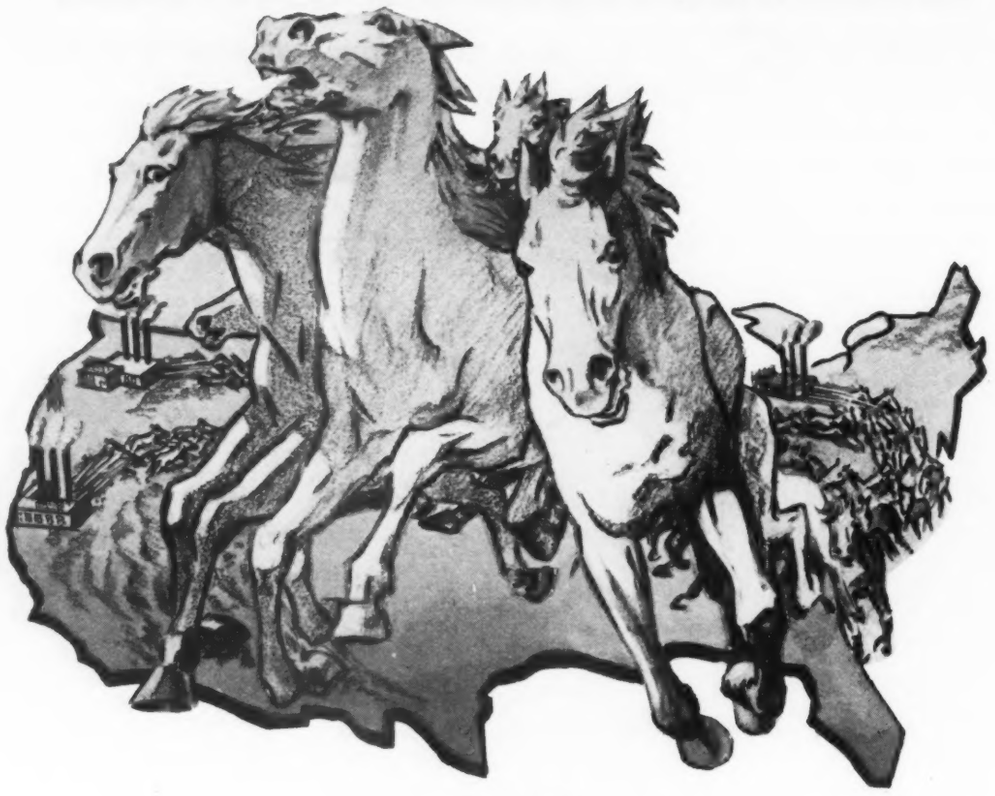

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ELECTRICAL WORLD

JULY 16, 1938

The Simple Way

From every side American business is being challenged, and not the least of these challenges is that of unsatisfactory public relations. The way out lies in simplicity of action, and that is what makes it so difficult.

Some people think, and that seems to have been a trait of human nature all through the ages, that to overcome any problem a complicated, on-the-face-of-it hard solution must be found. In most cases, however, it is the simple approach that is most effective.

The public thinks simply and acts simply. Mass opinion is not capable of being complicated. Moreover, mass opinion is arrived at, not by the path of laborious, logical argument, but by the simple means of repeated statement.

Take the utility situation, for instance. What does the public think or say? For one thing, it says that rates are too high and that electricity costs too much. Now those are simple ideas. How did the people get them? Were they thought out? Were bills analyzed? No. Somebody told them and it was repeated and repeated.

Nor are these the thoughts only of the morons, of the uneducated. The thought of the masses reaches even into high places, showing that mass thinking is infectious and spreads. Likewise, any correction of erroneous thinking on the part of the public will come with equal simplicity. Think how many times some person has had a fancied grudge against another, only to have it fade away as soon as the other fellow went directly to him and said, "Why, what's it all about?" Well, the public's that way, too.

The utilities, like all other businesses, have shied away from tackling this public relations problem because they were afraid of it. And they are right not to start anything until they know what they are doing. On the other hand, to delay action much longer can be extremely costly.

It is not necessary to engage in any attack upon municipal ownership, or administration activities. The utilities have a positive story of their own to tell. The public is willing to listen to that story, provided it is told directly and straightforwardly.

Before any program is initiated, it is essential first to find out what the public really thinks. This need not be a laborious job, but at the same time it should not be lightly undertaken. A sampling from all districts, and all degrees of social position, taken by unbiased investigators, will unearth any sore spots. Correction of them is first on the list.

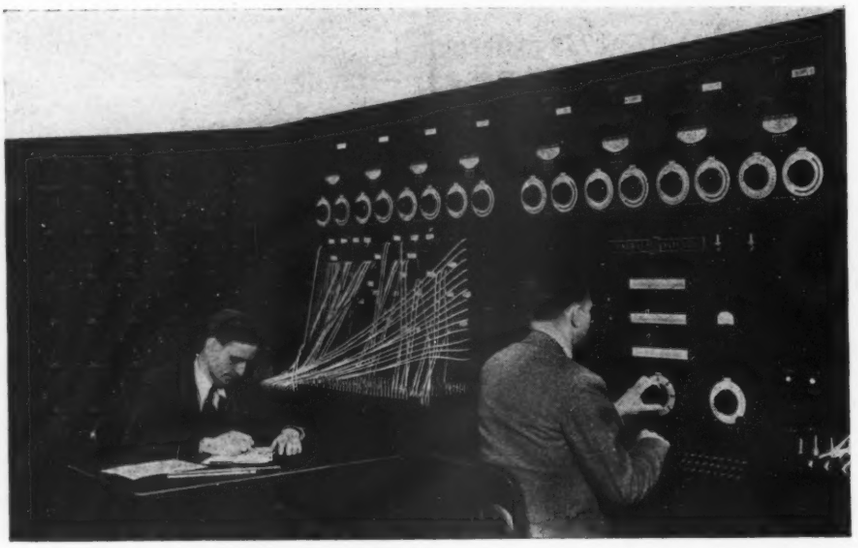
But public relations work lies not alone in correcting unfavorable conditions; its lasting value will come from more aggressive efforts in selling the company to the public. In other words, the public, or some part of it, can be sore, don't care, or friendly. It is equally as important to change over the "don't cares" into boosters and friends as it is to eliminate the soreheads, for in times of municipal ownership it's the "don't cares" whose votes win or lose an election.

And that is the trouble today. There aren't so many people who are actually sore. But there are a lot of "don't cares" who have too long been neglected. Changing them to friends is the challenge. It can be done, and it must be done, but its effectiveness will be in direct ratio to its simplicity.

Network Analyzer Points

By R. N. SLINGER

Central Station Engineering, General Electric Company, Schenectady, N. Y.



ECONOMIC pressure plus an increasing trend toward higher service standards has made system planning and design an indispensable part of the activities of the modern electric power system. Guesswork is rapidly being replaced by careful studies of system performance under various assumed operating and load conditions. The reward for this work is received in the form of economies and operating improvements. Unfortunately, though, planning problems are becoming more involved and difficult of solution as a result of such factors as interconnection and natural system growth.

Reasons for Using Analyzer—A really comprehensive study of a complicated network by means of long-hand calculations requires an infinite amount of patience and an almost prohibitive amount of time. There are usually so many possible combinations of circuits, generation and loadings that under such circumstances it is ordinarily feasible to consider only a very limited number of operating conditions. Furthermore, in order to reduce the problem to a reasonably workable form it is usually necessary to resort to various simplifications and approximations which may impair the overall accuracy of the final results. Such a compromise procedure is, of course, far better than no study at all, but it still involves too much uncertainty and element of risk to be entirely satisfactory.

An appreciable saving in the time required for these studies can be made by using a d.-c. calculating board to determine such things as breaker interrupting duty and relay settings, although this generally represents only a part of the planning

A.C. Network Analyzer Answers Multiplicity of Questions

A.—Load Division Problems.

1. Circuit loadings.
2. Bus voltages.
3. Synchronous condenser capacity needed.
4. Ratings of transformers and transformer windings.
5. Tap range of transformers.
6. Benefits from load ratio control.
7. Benefits from out-of-phase control.
8. Best location for new generation.
9. Effect of adding new transmission circuit or rearranging existing circuits.
10. Determination of best location for new substation.
11. Effect of bus reactors.
12. Effect of increased system loadings.
13. Effect of changes in transformer reactance.
14. Effect on system of loss of various transmission circuits.
15. Effect of loss of generation or synchronous condenser capacity.
16. Effect of increased system voltages.
17. Effect of increased conductor size.
18. Determination of wattless flow.
19. Investigation of system losses and means of reducing them.

B.—Short-Circuit Problems—Three Phase and Unbalanced Faults.

1. Maximum short-circuit currents for determining breaker duty.
2. Bus voltages during short circuits as a measure of fault severity and net effect on system.
3. Maximum and minimum fault currents and voltages for determining relay settings or for proper application of expulsion protective tubes.
4. Determination of zero sequence currents for inductive co-ordination problems.
5. Effect of mutual coupling between circuits on short-circuit currents and voltages.
6. Determination of grounding transformer rating.
7. Effect of ground fault neutralizer (Petersen coil) on fault currents in the transmission network.
8. Effect of various types of system grounding.

C.—Stability Problems.

1. Steady state limits.
2. Transient limits with various types of faults.
3. Breaker opening times required for various types of faults and fault locations.
4. Effect of bus reactors on transient stability.
5. Effect of various amounts of WR^2 on transient stability limits.
6. Effect of various values of transient reactance on transient stability limit.
7. Determination of increase in transient stability limit with various switching and relay times.
8. Effect of various switching and bus arrangements on stability limits.
9. Effect of quick reclosure of breakers.
10. Extent to which transient stability limit is affected by saliency and decay of flux linkages.
11. Effect of damping torques on transient stability limit.
12. Effect of high-speed excitation on transient stability limits.
13. Time required for generator to pull out of step after loss of excitation and effect on rest of system.

D.—Special Circuit Problems.

1. Starting and pull-in characteristics required for large synchronous motors connected to a transmission system at some distance from nearest generating station.
2. Determination of best method of starting large synchronous motors or synchronous condensers.
3. Solution of special network problems.
4. Reduction of a complicated network to a more simple equivalent.

Way to System Betterments

problem. Load division, voltage regulation and frequently stability are of primary importance, and for such studies the d.-c. calculating board is not particularly well suited. Furthermore, it is the solution of these phases of the problem that is usually the most tedious and time-consuming operation.

To make it possible to give these problems, in a reasonably short time, the thorough study they deserve, the a.-c. network analyzer was developed and has been made available for the use of operating companies and others faced with system planning problems. Although it should be regarded as merely a tool, the analyzer does eliminate most of the computations that are ordinarily required. After a network has been set up and adjustments made for a load balance it is a simple and easy matter to read the power flow, bus voltages and other important information. Complicated problems require only a minimum of simplification when solved in this way, thereby giving improved over-all accuracy in the results and further savings in time. It thus becomes entirely practicable to investigate enough different operating conditions to be reasonably certain that something of importance has not been overlooked.

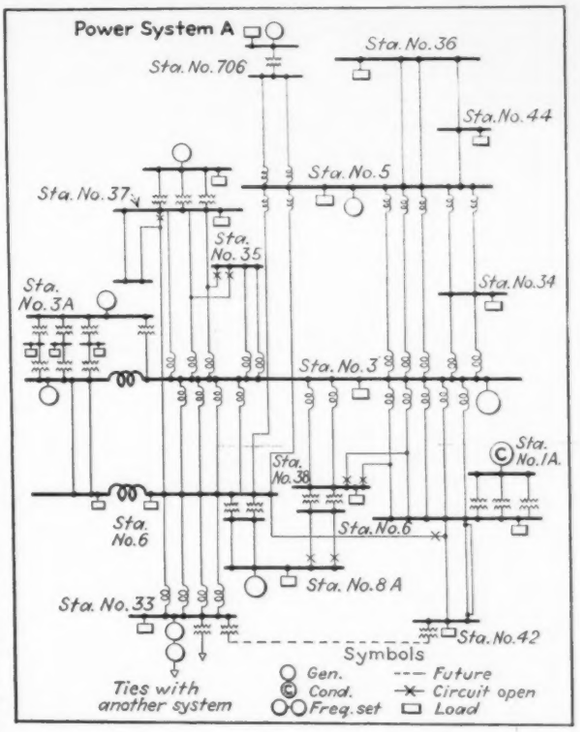
Another outstanding advantage of the analyzer is that it gives the engineers making the study a graphic picture of system performance in miniature and affords them the opportunity to experiment at will with different connections and operating conditions. It also permits them to study transient disturbances accompanying short circuits in slow motion by simply employing a step-by-step form of solution.

Information Obtainable from A.-C. Network Analyzer — The usefulness of the a.c. network analyzer for the purpose indicated can be judged by referring to the accompanying tabulation, in which the various types of information obtainable have been classified under four main headings, representing the four general types of problems that are usually investigated in a system planning study. There are doubtless other items that might be added to this list, and as time goes on still others will be devised. However, the tabulation as presented should indicate clearly the wide variety of problems for which the analyzer is suited.

As another means of demonstrat-

Power would not flow as assumed

A company supplying a fairly large metropolitan area over an 11-kv. cable network from nearby hydro and steam stations was faced with the necessity of providing for increasing loads within the area served. Plans already under way for the addition of a new 25,000-kw. turbine would solve the immediate generation problem, but it was not so easy to decide what changes should be made in the network. Operating records indicated that under peak conditions some of the cables carried excessive loads, while others operated well below their ratings. Also at these times certain bus voltages were too low. One of the particularly bad areas in both respects was at a station marked No. 42 in the accompanying diagram. It was recognized that the addition of the new 25,000-kw. generator would result in breaker interrupting duty becoming a serious problem. Hence it was planned to install bus and feeder reactors, but more specific data were needed for their proper application. The analyzer study gave complete information in regard to loadings over the entire network, and by trying various arrangements of circuits and bus connections while the study was in progress means were found for more evenly distributing the cable loadings.



At station No. 42 it had been planned to obtain a 33-kv. feed from station No. 33, as shown by the dotted line in the diagram. This could easily have been provided by extending some existing overhead circuits and using some old 25-cycle transformers that would soon be available. The scheme was very attractive economically, but unfortunately the network analyzer showed that this overhead circuit would not load up as expected because the power preferred to take other paths. Further investigation immediately indicated the reason. The voltages at stations Nos. 33 and 42 were found to be very nearly the same in magnitude and in phase angle. Hence, there was practically nothing to force power over the proposed high impedance tie; 33-kv. cable in place of the overhead circuit gave some increase in loading, but not nearly as much as had been expected. To cause the desired amount of power to flow it was found that a phase-shifting transformer would be required.

It was recognized that one of the most favorable locations for the addition of new steam generation would be at station No. 33, where 60-cycle and 25-cycle ties were maintained with another system. By means of the analyzer it was comparatively easy to determine which of several possible circuit arrangements would be best for delivering this additional power to the system.

Three-phase short circuits taken at the conclusion of the load study showed that with the new generation at station No. 3 as expected, reactors would be required at practically all of the major stations in order to keep within the breaker interrupting ratings.

ing the utility of the analyzer as a tool for the planning engineer a few typical examples are presented which have been taken from system planning studies actually made on the General Electric network analyzer in Schenectady and are typical of studies of this type. The complexity of the problems and the difficulties that would have been encountered in solving them by long-hand calculations can be judged from the accompanying one-line system diagrams.

Indications often surprising

Probably the most significant thing about not only these particular studies but also others of a similar nature is that the results usually contain some element of surprise for the engineers making the study. Sometimes the results for some particular phase of a problem are quite different from what had been expected, and then the network analyzer is useful in showing where and how the original tentative conclusions were in error and thereby in giving a better understanding of system performance. In other instances the analyzer reveals new and unexpected problems which may have been present for some time but were not felt because the operating conditions up to then had not happened to be such as to make these problems manifest. By discovering them in advance in this way solutions usually can be worked out and corrective measures put into effect before these troubles actually develop on the system.

It thus becomes evident that operating companies which are not taking advantage of this modern engineering tool are passing up an opportunity to enjoy the feeling of security which comes from a more complete knowledge of system performance, and also may be overlooking ways of making wiser and more profitable system extensions.

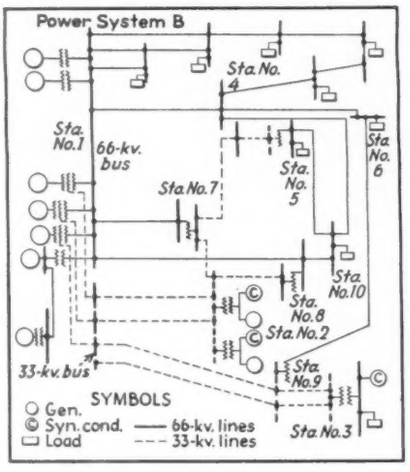
On this system a 66-kv. loop was being constructed around the present 33-kv. system by adding new circuits and by changing over some of the existing 33-kv. circuits. The purpose of this loop was to relieve circuit loadings on the 33-kv. system and to permit maintaining higher bus voltages at the important substations. The 66-kv. loop was to be tied into the 33-kv. system at four locations by means of auto-transformers, as shown in the diagram. Two of these auto-transformers would be new units having relatively low reactance and the other two would be old units with relatively high reactance.

The system study was undertaken with two definite purposes in mind, namely, to determine the best locations for the four auto-transformers and to determine the relay settings and breaker interrupting ratings required after the completion of the 66-kv. loop.

Somewhat to the surprise of the engineers making the study, it was found that although the 66-kv. loop would relieve the loading on the 33-kv. system to some extent, it would not relieve it as much as had been expected because the auto-transformers introduced quite an appreciable amount of impedance into the circuits.

With load growth continuing at approximately the existing rate it was recognized that additional generation would be needed by about 1939, although this was not expected to present any unusual problems. It was naturally felt that it should be added to station No. 1, which was the newest and largest station on the system. Station No. 2 was nearer to the load center, but it was comparatively old and some difficulty was being experienced in maintaining an adequate supply of cooling water there. Hence, it had been planned to make no further capital expenditures for station No. 2 and to ultimately use it for stand-by service only. However, the engineers received another surprise when the network analyzer very clearly showed that the new generation could more effectively relieve circuit loadings and maintain acceptable voltage levels at the load centers by putting it at the old No. 2 station. The system plans were accordingly revised and the unit has subsequently been ordered.

As one of the incidental features of the study, it was discovered that if two of the three circuits which now feed a city of considerable importance should happen to be tripped out at the same time, voltage could not be maintained there under existing conditions. However, it was found that it could be done by adding approximately 4,000 kva. in synchronous condenser capacity.

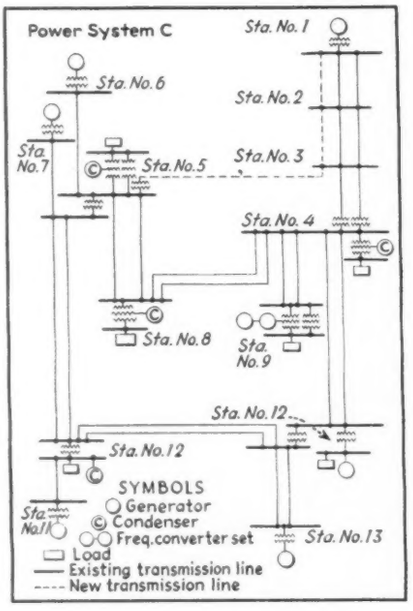


Proves better to rehabilitate a load center station

A company supplying power to several important metropolitan areas from a number of large hydro plants and steam stations located in rather widely separated regions was interested in determining which of several schemes for extending and modifying its extensive transmission system would best provide for future load growth. There was an urgent need for a thorough study of the problem at that particular time, since construction work had already been started on a third circuit (shown dotted in the diagram) from the most remote but the largest and probably the most important generating station on the system, represented here as station No. 1. It had been determined from a preliminary investigation of the problem that station No. 5 was the logical place at which to terminate this new line, but to intelligently choose between the various possible connection schemes it was necessary to evalutate their relative advantages and disadvantages. By setting this study up on the analyzer it was possible to investigate, in a comparatively short time, load division under both normal and emergency operating conditions, transient stability with two line-to-ground faults, breaker interrupting duties and relay settings for line-to-ground faults.

The load study showed that satisfactory load division could be expected from any of the three basic schemes that had been considered, although it was found that synchronous condenser capacity could be more advantageously distributed. A total of about 200,000 kva. of condenser capacity was needed at one station and 100,000 kva. at each of two others, regardless of which scheme was adopted.

The transient stability problem proved to be not particularly serious, although it did have considerable bearing on system design. It was found that if a two-line-to-ground fault occurred on one of the high-voltage lines from station No. 1 at a time when one of the three other circuits in that particular section happened to be out of service instability would occur, but a fault could be cleared on the new third circuit, by switching it out all the way from the hydro station to the second switching station without losing stability, although the margin of stability was small. This would suggest the possibility of omission of the sectionalizing breakers for this circuit at the intermediate or No. 2 switching station with a saving in cost, except for the fact that the ultimate theoretical capacity desired was higher than the loads used in obtaining the foregoing results and also because of the definite element of risk that would be involved. Without the intermediate switching station instability would be almost certain to occur when a fault took place on the new circuit, with one section of the present line from the No. 1 hydro station out of service. With the new circuit sectionalized at the No. 2 switching station stability might still be maintained with one section of line out, since there would be an even chance that when a fault occurred it would not be an adjacent line section.



Most advantageous scheme for sectionalization

Sales Total $65,000 in One Day

Kansas City Power & Light Stages a 24-Hour "Jubilee" With Co-operating Dealers

THERE is at least one way to prove that Old Man Recession is merely a fear hallucination haunting the minds of salesmen—and buyers! The Kansas City Power & Light Company, subsidiary of the United Light & Power Company, and the Electric Association of Kansas City on Monday May 23, 1938, staged a "Twenty-four Hour Electric Jubilee." To the outsider it was an intensified, concerted sales drive on the part of the Kansas City appliance distributors and dealers.

Everybody's party

The objective was to move $100,000 worth of major electrical appliances in one day and night. And, surprisingly enough, nearly 65 per cent of this amazing quota was reached with the enthusiastic support of thirty-seven dealers and three distributors.

Some 200 dealer salesmen gathered at the breakfast rally on Monday morning to be girded with enthusiasm and the determination to blast through walls of "sales resistance," and return with the sales.

Among other things, the dealers informed their men to report to their respective stores for a late afternoon pep-meeting and to be prepared to report two specific calls scheduled for evening.

The men also were instructed to telephone each sale to campaign headquarters as soon as it was completed.

Special emphasis, of course, was placed on the necessity for clinching the sales—"the sale's the thing, prospects don't count," they were told.

Before the breakfast meeting adjourned two-inch lapel buttons, reading "Kansas City's 24-Hour Electric Jubilee," were distributed to be worn and used in closing sales. Salesmen reported that the buttons helped to get the name on the dotted line. "Some of them bought during the drive just to feel that they were a part of the plan to stimulate sales," said the salesmen.

All campaigners were invited to an open house rally at the Jubilee headquarters at 10 p.m. that night, when a buffet supper served to refresh the men after a strenuous day and night of work.

After a man's-sized breakfast, a certain amount of lusty if not exactly tuneful group singing and a number of inspiring talks by campaign leaders, the men were primed and cocked to do a real selling job.

The early morning meeting lasted until 8:15 o'clock, and by 9:30 the first sale was recorded at campaign headquarters. From then on they literally rolled in. Mid-day saw 17 per cent of the total sales tabulated, and at 6 p.m. 46 per cent of the total orders were in the bag.

More sales after six

This proved the contention of the sales executives that sales are made at night. Of the total, 54 per cent of the campaign sales were closed after 6 p.m. When 10 p.m. rolled around 70 per cent of the sales could be accounted for. The climaxing sale of $454 was made at 2:30 in the morning.

The drive was not devoid of large sales. One dealer clinched a deal involving beverage coolers valued at $4,350. Another closed the sale to a residential builder of ten ranges, ten dishwashers and ten garbage disposalls.

As would be expected at this time of the year, refrigerators topped the volume list with 148. Radios and ranges came next with 98 and 74 units respectively.

An interesting sidelight of the drive is the fact that five of the twelve dealers, who booked more than $1,000 in merchandise during the Jubilee, were outlying dealers.

Trial campaign first

This co-operative 24-hour sales effort, the first to be attempted in Kansas City, was destined for success. The Kansas City Power & Light Company staged a similar test campaign among its own sales force of some forty men to prove the feasibility of sponsoring this city-wide appliance drive. It was found that a high degree of effective enthusiasm could be sustained over such short periods and without unfavorable sales reaction.

One of the "bugs" in a campaign of this sort, some sales executives cautioned, is a costly after-drive letdown on the part of sales and salesmen. But the "doers" had a job to do and did it without any after slump.

The plan of notification of the campaign was for the dealers to say nothing to their men; instead, on Sunday, the day before the breakfast rally, they sent a 50-word telegram notifying them of the breakfast and requesting their presence. A special local rate was obtained to deliver the uniformly worded telegrams for 17 cents each. This telegram cost was the only part of the campaign expense shared by the dealer.

Campaign costs $313

Expense of the entire campaign, including telegrams to the dealer-salesmen, was only $313, of which the Kansas City Power & Light Company paid half; the distributors paid the other half, excepting, of course, the telegrams.

Service to barns and other farm buildings is important

Farm Service Sells Farm Service

Utility Installs Complete Electrification on Selected Farms and in Return for Five-Month Demonstration Offers Price Concessions

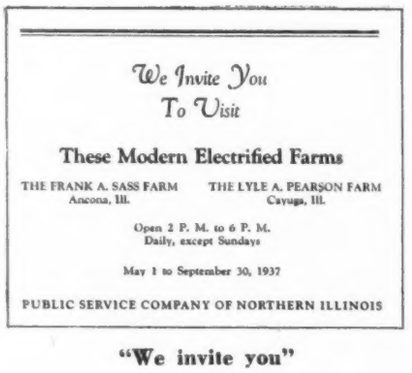
By THOMAS H. HASLAM

Sales Promotion Manager, Southern Division, Public Service Company of Northern Illinois

PUTTING to work the old truth that the satisfied user is the best salesman, the Public Service Company of Northern Illinois is trying out a different method of farm service demonstration in its southern division. So far, from the beginning of the plan last year to the more developed form at present, the results have been very gratifying.

Briefly, the plan is to equip a farm for complete electric service, with the customer agreeing to demonstrate the installation to visitors. A résumé of the terms of the agreement—stated in a contract between the customer and the company—appears at the end of this article. There are three such demonstration farms now in operation. The accompanying table shows the equipment and appliances used and shown at each. Two of them, the Sass and Pearson farms, were equipped and ready for visitors May 1 and continued until September 30; the third, the Beckman farm, opened and closed a month later.

Places are selected as demonstrators simply by finding a likely looking farmstead in a suitable location and asking the farmer and his wife if they'd like the experience. Usually they think they would. Then the company modernizes the kitchen, puts in wiring, does a plumbing job, installs equipment; in fact, converts the home, yard, barns and all into an up-to-date electrified farm. The expense to the company for wiring, plumbing and other non-removable improvements and for installation of equipment and appliances depends, of course, on individual conditions, but it is not large—probably $200 would cover the highest. This is the non-recoverable expense that would have to be borne by the company—but in no case yet has the company had to do so—if the customer decided at the end of the demonstration period that he wanted everything taken out. Counting improvements and equipment and appliances at list prices the company will have an investment of around $1,000 in a demonstration farm.


We Invite You
To Visit
These Modern Electrified Farms
THE FRANK A. SASS FARM
Ancona, Ill.
THE LYLE A. PEARSON FARM
Cayuga, Ill.
Open 2 P. M. to 6 P. M.
Daily, except Sundays
May 1 to September 30, 1937
PUBLIC SERVICE COMPANY OF NORTHERN ILLINOIS

"We invite you"

At the conclusion of the period the farmer and the company get together and agree on a lump sum price for the installation and for the equipment and appliances desired to be retained. So far it has been found that the farmer and his wife are quite desirous of keeping all the comforts and conveniences to which five months of use have accustomed them and are perfectly willing to pay a fair price for them. In general, appliances and equipment are figured into the lump sum price at liberal discounts from list in consideration of the use they have had in the demonstration period.

When the plan was first tried out no very high hopes were entertained as to how much of the installation

Equipment and Appliances on Demonstration Farms

Equipment	Sass Farm	Beckman Farm	Pearson Farm
Refrigerator	1	1	1
Range	1	1	1
Household water heater	1	1	1
Washer	1	1	1
Ironer	1	1	1
Kitchen mixer	1	1	1
Vacuum cleaner	1	1	1
Lighting fixtures and I.E.S. lamps for first floor	1	1	1
Toaster	1	1	1
Electric clocks	2	2	2
Coffee maker	1	1	1
Sewing machine	1	1	1
Electric fan	1	1	1
Electric fly killer	1	1	1
Brooder (500 chicks)	1	1	1
Dairy water heater	0	1	1
Poultry water warmer	0	0	0
Pump jack and ½-hp. motor	2	1	1
Milking machine	0	1	1
Cream separator	1	0	0
⅓-hp. portable chore motor	1	0	1
Yard lighting (300-watt lamps)	3	3	3

the customer would wish to keep after the termination of the demonstration agreement. It was thought that the farmer and his wife would feel they could get along nicely without many of the devices and appliances that most farm people think of as in the luxury class. But when the time came to give them up there were surprisingly few things that could be spared. One farmer, who from the beginning and all through the demonstration had asserted he had no money for such things, reached into his jeans for $575 in cash to pay for practically the entire installation. On the four demonstration farms last year more than 80 per cent of the equipment and appliances installed were retained.

Demonstration farms are selected to be on side roads, not on main highways. This is to protect the farmer and his wife against a large number of casual visitors. It is intended that visitors to the demonstration farm shall be people who go there by intention and not simply all who happen to pass. In order to inspire interested visitors the company sends out invitations, as shown here, to the people in the surrounding area. These invitations are mailed to personal addresses and are sent out in batches during the period so that the demonstration farm will have a steady flow of visitors and not be overrun at the beginning and deserted at the end. The average number of visitors per farm runs about 75 per week.

In addition to the daily stream of visitors, groups from women's clubs, churches, farm bureaus and other organizations are brought to the demonstration farms under the guidance of home service girls of the company. As many as a hundred women may be included in such a group. Each demonstration farm entertains a group of this kind about once a week.

Sales of appliances and electrical improvements in farm homes directly traceable to these demonstrations amounted in 1936 and 1937 to 79 ranges, 57 water heaters, 51 refrigerators and five milking machines.

Terms of Contract for Rural Service Demonstration

1. Customer agrees to allow utility to install and demonstrate wiring, equipment and appliances on customer's premises.

2. Unless extended, contract runs for five months, with utility paying customer $35 per month.

3. Utility has free daily access to premises during specified afternoon hours for demonstration purposes.

4. Customer gives equipment and appliances normal daily use and demonstrates to visitors.

5. Wiring, equipment and appliances remain the property of the utility and customer will not dispose of them. Customer agrees to forward names of prospective purchasers to utility.

6. Customer has option to purchase at an agreed price all equipment and appliances at termination of agreement, but is not required to do so.

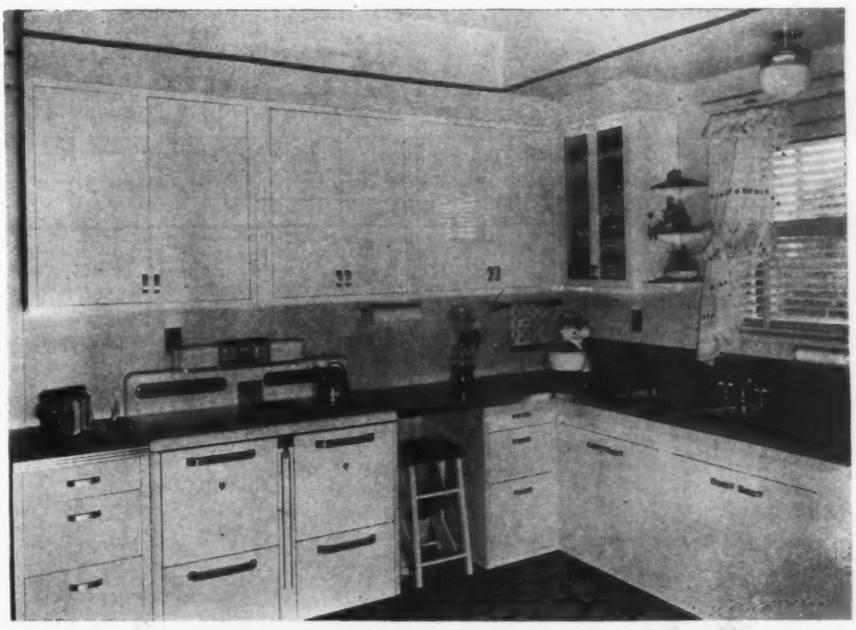
7. Customer saves utility free from damage arising out of the arrangement, except as damage may be caused by the utility itself.

8. Utility agrees not to file any mechanic's lien for labor or material used in installation of equipment.

9. Customer pays at regular rates for energy consumed both for normal use of equipment and appliances and for their demonstration to visitors.

10. Customer uses reasonable care, as if it were his own property, to protect equipment and appliances from theft and damage, but is not liable if they occur in circumstances beyond his control.

11. Equipment and appliances installed may be changed or modified by mutual agreement during the term of the contract.

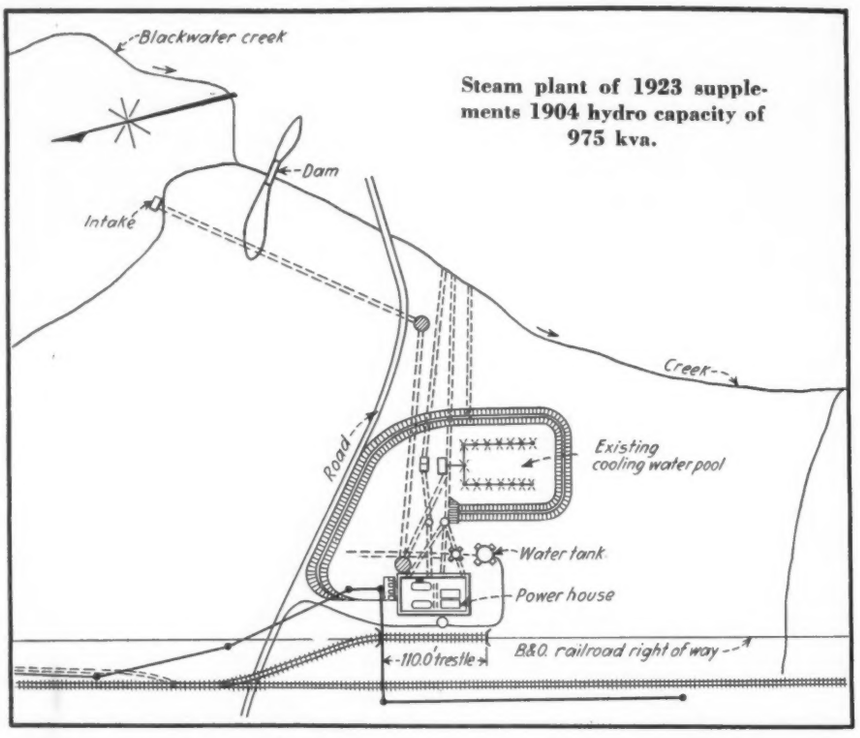


Modernized kitchen of the Sass farm

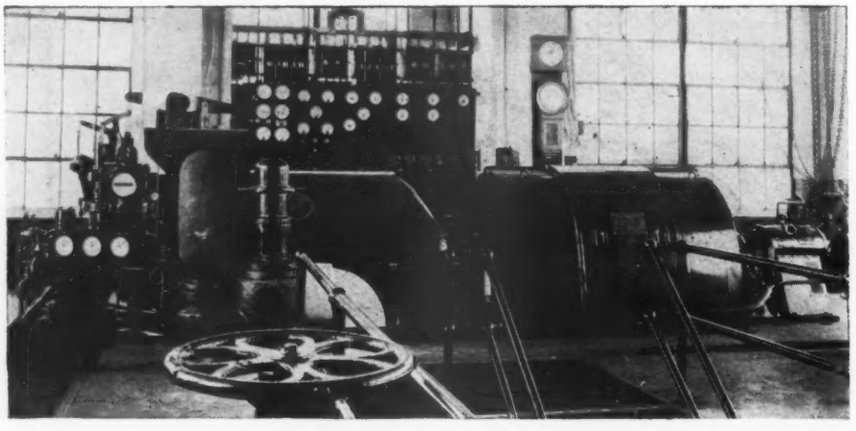
Livingston County Rural Home Club visits the Pearson farm

Revamped Plant Gets Added

By ALLEN B. McDANIEL
Director The Research Service, Washington, D. C.



Situated about 3 miles south of the city, the plant was built on low land between the Valley branch of the Baltimore & Ohio Railroad and Black's Creek, a small stream with a drainage basin area of about 2½ square miles. A siding with a timber trestle furnished a source of coal supply and storage for the boilers, and water for the cooling water system was taken first from the creek and later from a large spring adjacent to the stream. Boiler water was furnished by a 2-in. line, extending south ½ mile from a 6-in. city main.



New switchboard serves old and new equipment

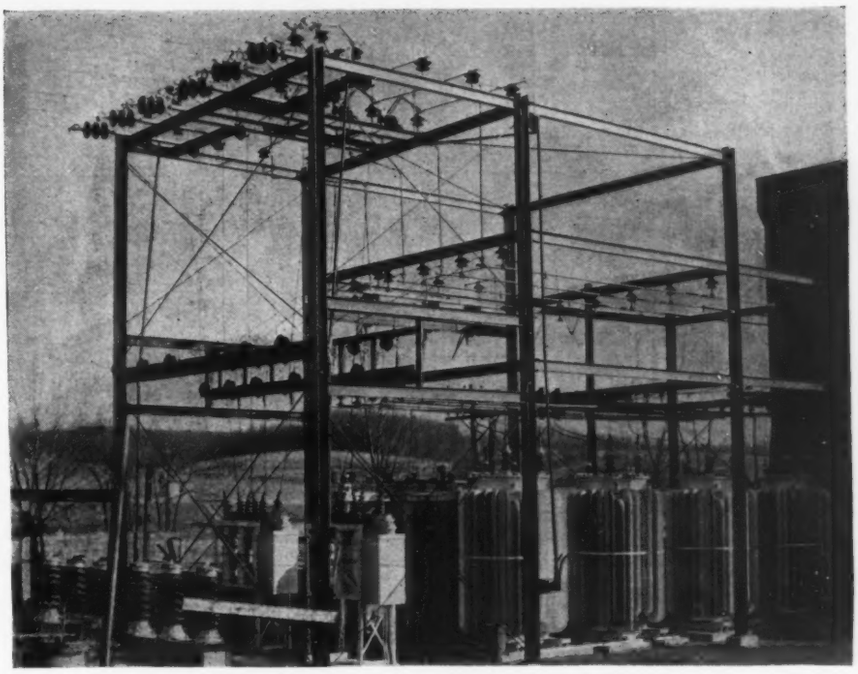
The new switchboard includes the original generator and feeder panels for the two generators (500 kw. and 1,000 kw.) with the addition of induction type overcurrent relays and disconnecting switches; a new generator panel with complete meter, and switch equipment for the new 2,500-kva. turbo-generator unit and a new feeder panel for the control of 3,000-kva., 2,400-volt, three-phase, 60-cycle power feeder to the transformer bank. Three voltage regulators, (one for each generator unit) of the automatic rocking-contact type, were installed in a separate bank adjacent to the switchboard. Complete switchgear equipment, on a pipe frame structure, was placed in the rear of the switchboard and comprised the oil circuit breakers, disconnecting switches, current and potential transformers, buses, etc.

ORIGINALLY built in 1923, the steam plant of the municipal electric department of Harrisonburg, Va., has been modernized and 2,100 kw. of generating capacity added at a unit cost of $90 for the revamped installations.

Recognizing the limitations imposed by the existing situation, considerable study was given to the location of an additional turbo-generator unit. An addition to the existing building to house the new equipment was impracticable, on account of lack of sufficient space, and would have required the closing up of a driveway on the west side, or the building over of underground structures of the cooling water system on the east side. Large-scale layouts were made of the existing turbine room floor and it was found feasible to locate the new 2,000-kw. turbo-generator unit at the north end of the room and with the axis at right angles to the present machines. This location involved the removal of the switchboard and switchgear equipment into a new gallery built as an addition to the north end of the turbine room. The ground floor of this addition furnished space for a toilet and storeroom. This compact layout brings all of the equipment and control boards within immediate reach and control of the operator, who has a desk and open office in the center of the south side of the turbine room.

The decision to install the 2,000-kw. unit was made as the result of the survey of the plant by The Research Service, Washington, D. C. Back-pressure conditions obtained in the plant, requiring a considerable revamping of the power piping system. An economic study indicated the desirability of installing a generating unit of sufficient size to enable subsequent shutting down and repairs of the existing equipment and the reorganization of the power piping and cooling water systems to provide for future operation of any generating unit or combination of units and to utilize the cooling water system with a minimum of changes to produce, as far as practicable, a closed, balanced system.

Kw. at $90



Outdoor switching and transformer station revamped

Installation of the new electric generating equipment and its hook-up with the existing equipment of the plant in operation involved much overtime work on night and week-end shifts, when the load could be carried by the hydro plant. This equipment includes the following:

One Westinghouse 2,000-kw., 3,000-r.p.m. combination impulse reaction turbine, designated for operation with steam conditions of 200 lb. per square inch gage, 100 deg. F. superheat at 28 in. vacuum, but suitable for changeover to 450 lb. per square inch, 750 deg. F. total temperature in the future—maximum capacity of the turbine is 2,500 kw. at 100 per cent power factor with a rating of 13.29 lb. of steam per kilowatt per hour; direct connected to the turbine is an alternating-current turbine generator with a capacity of 2,500 kva. at 80 per cent power factor, 2,400 volts, three phase, 60 cycles, two poles, 3,600 r.p.m.; an exciter, direct connected to the generator, with a capacity of 19 kw. at 125 volts. Accessory equipment comprised a Westinghouse surface condenser, two-pass, radial flow, with 2,500 sq.ft of effective surface; a circulating water pump of 3,400 gal. per minute capacity, at 1,160 r.p.m. and driven by a 60-hp. squirrel-cage motor, three phase, 60 cycles, 440 volts, single stage; a condensate pump of 75 gal. per minute capacity, 1,750 r.p.m., driven by a 5-hp. squirrel-cage motor, three phase, 60 cycles, 200-440 volts, and air-removal apparatus of twin two-stage steam air ejector mounted on combined surface type inter and after condenser.

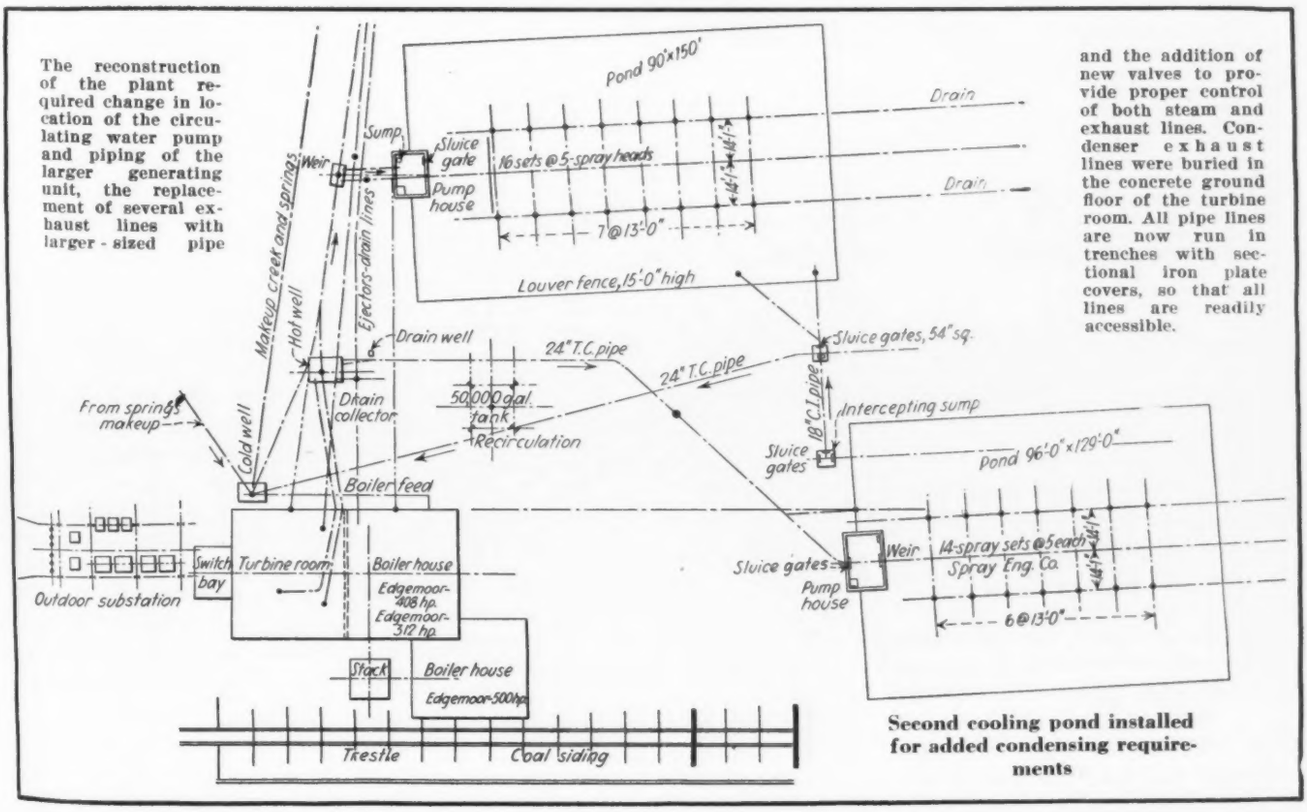
Outdoor station rebuilt

The outdoor station was entirely rebuilt to provide suitable transforming and protective equipment for the steam-generating plant.

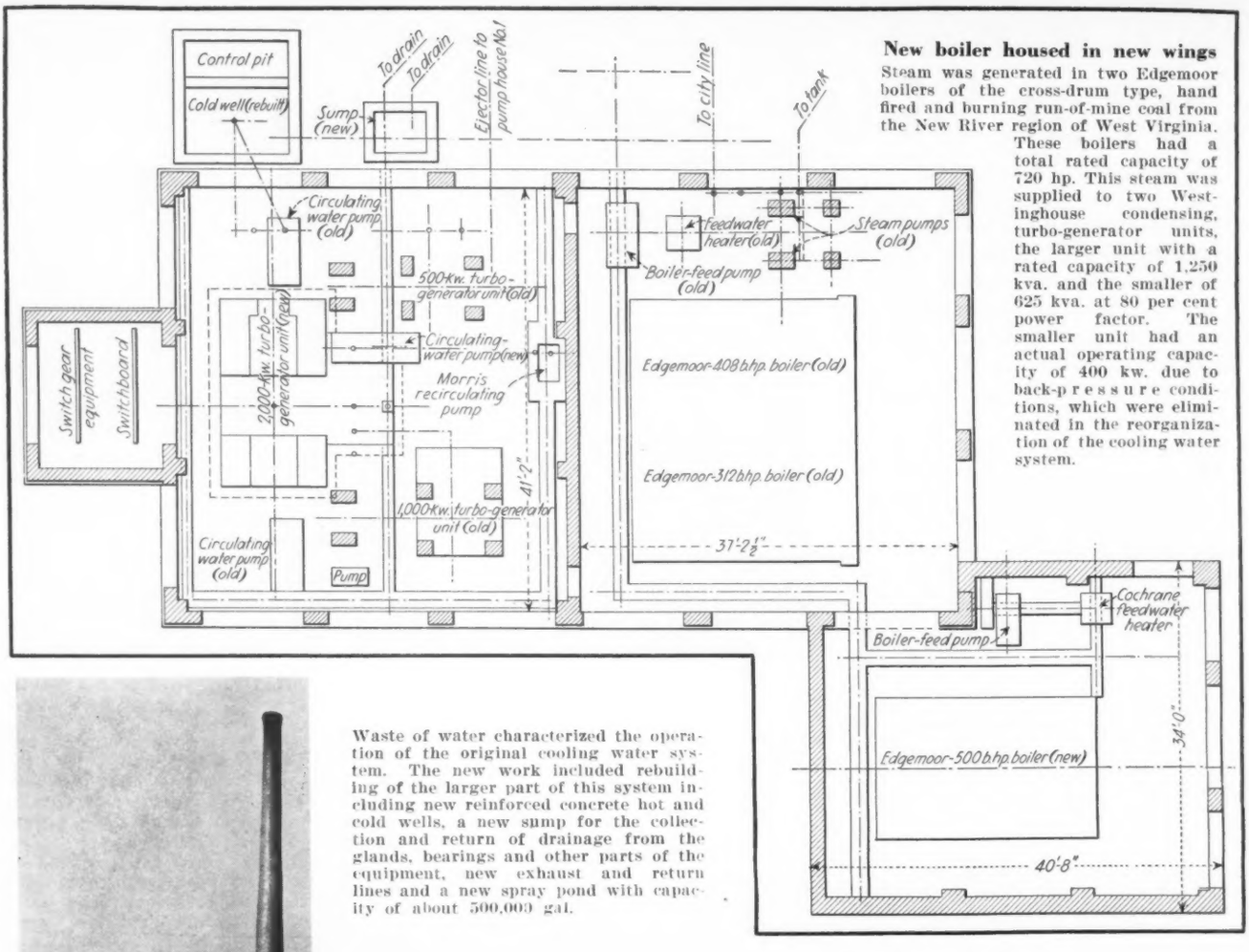
The original transformer equipment of three 600-kva. and three 200-kva. transformers was changed by removing the three 200-kva. transformers to the city substation and installing four 1,000-kva. outdoor type, oil-insulated, self-cooling transformers. Two grid oil circuit breakers—3 P. S. T., 600 amp., 23,000 volt, electrically operated—were set up between the two banks of transformers and the two sets of autovalve lightning arresters. Disconnect switches were placed on the two sets of outgoing lines to cut off these lines from the plant in case of emergency.

The new 500-b.-hp. Edgemoor cross-

The reconstruction of the plant required change in location of the circulating water pump and piping of the larger generating unit, the replacement of several exhaust lines with larger-sized pipe and the addition of new valves to provide proper control of both steam and exhaust lines. Condenser exhaust lines were buried in the concrete ground floor of the turbine room. All pipe lines are now run in trenches with sectional iron plate covers, so that all lines are readily accessible.

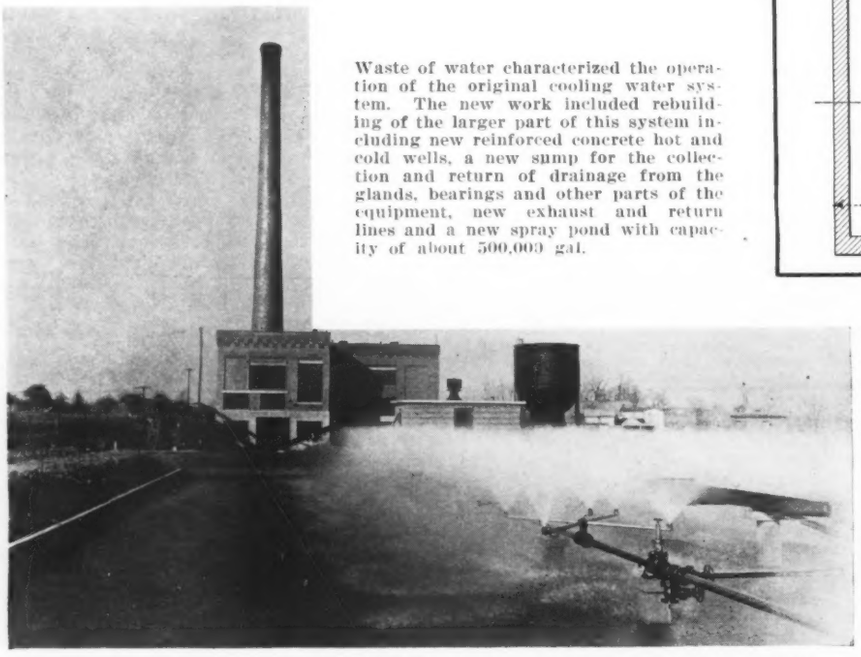


Second cooling pond installed for added condensing requirements



New boiler housed in new wings

Steam was generated in two Edgemoor boilers of the cross-drum type, hand fired and burning run-of-mine coal from the New River region of West Virginia. These boilers had a total rated capacity of 720 hp. This steam was supplied to two Westinghouse condensing, turbo-generator units, the larger unit with a rated capacity of 1,250 kva. and the smaller of 625 kva. at 80 per cent power factor. The smaller unit had an actual operating capacity of 400 kw. due to back-pressure conditions, which were eliminated in the reorganization of the cooling water system.



Waste of water characterized the operation of the original cooling water system. The new work included rebuilding of the larger part of this system including new reinforced concrete hot and cold wells, a new sump for the collection and return of drainage from the glands, bearings and other parts of the equipment, new exhaust and return lines and a new spray pond with capacity of about 500,000 gal.

Use of the hard water from Black's Creek and the spring has necessitated cleaning of condenser tubes about every two weeks and occasional clogging of ejector nozzles and piping. To provide the soft, pure city water for condensing as well as boiler uses the 6-in. main was extended from a packing plant ½ mile south to the steam plant.

Second spray cooling pond provided

drum boiler and accessory equipment was installed in a brick and concrete addition—34 ft. wide and 41 ft. long—to the old boiler room. The boiler is fired with Firite overfeed type of stokers automatically controlled by the Cash Combustion Control system. Boiler water is supplied by a Cochrane feedwater heater and controlled by a Copes regulator. Bailey steam and air flow meters, Hays draft gages and CO_2 recorders and a stack temperature gage give continuous records in the boiler room and "on the bridge" of the turbine room of combustion conditions in the new boiler. All parts of the new equipment are made accessible by sub-floors of steel channel stringers with open grating floors, reached by stairways of the ship-ladder type.

The cost of the reconstruction of the transmission lines and revamp of the distribution system was $43,960.40. Assuming an increased system capacity* of 500 kw., the unit cost would be $87.92 per kilowatt. The cost of the reconstruction of the steam plant was about $190,000, not including expenditures of approximately $7,000 made for the reconstruction of the coal trestle, boiler repairs and the enlargement of the water supply line for a distance of one-half mile; these items were charged to the maintenance and operation account. The unit cost of the steam plant revamp, based on an increased generating capacity of 2,100 kw., was about $90 per kilowatt.

As the new equipment at the steam plant has been in operation about two months, operation costs are tentative, but indicative of material savings in the future when the plant has become adjusted to an efficient operating basis. Recent records indicate a coal consumption of 2.75 lb. per kilowatt-hour output, as compared with a former use of 3.25 lb. per kilowatt-

* See "Modernization of a Small Power System," *Electric Journal*, February, 1938.

[*Continued on page 90*]

Test Meter Load Held Automatically Constant

By W. C. WOODSON

Assistant Engineer, Meter Engineering Bureau, Consolidated Edison Company of New York, Inc.

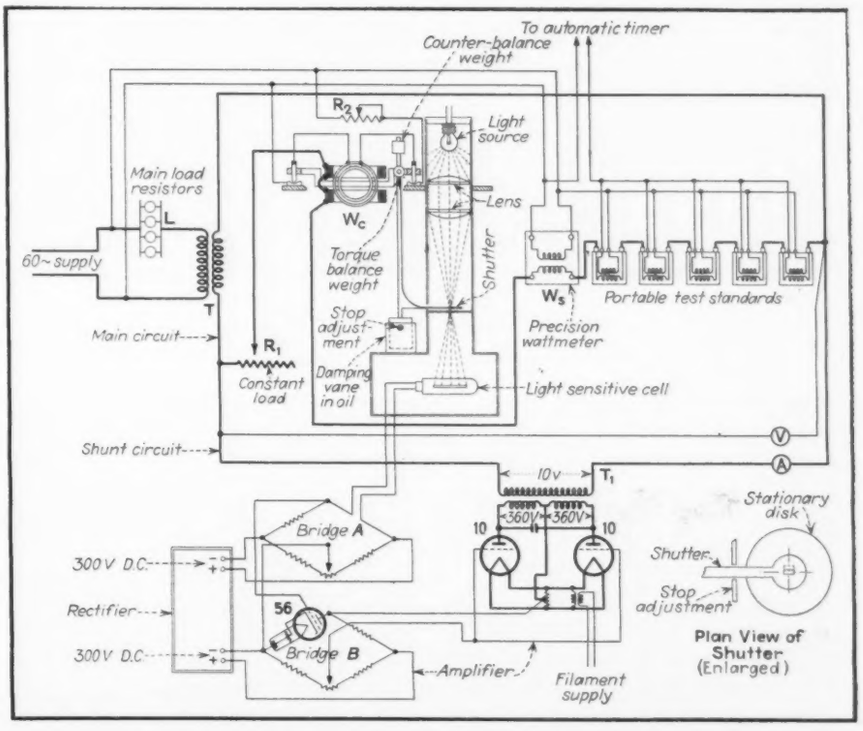
PRECISE timing and constancy of test load have been rendered entirely automatic in a new test board in the meter bureau shop of the Consolidated Edison Company. The board incorporates novel features that reduce the common errors from these two sources to such a degree as to afford precision calibration of a group of portable test standards. The accomplishment rests essentially on a control wattmeter functioning in connection with a photo-electric cell.

The testing of portable test standards used in the field calibration of watt-hour meters has not kept pace with the development and perfection of the standards themselves or of watt-hour meters. For when it is considered that the modern watt-hour meter registers within plus or minus 0.5 per cent it immediately becomes apparent that the test of the portable test standard requires that both the instruments used and the method of check employed involve a high degree of precision.

The usual method is to measure the load with an indicating wattmeter, to count the revolutions of the standard, to measure the time, and then from known constants to calculate the accuracy. The accuracy of this method depends upon the precision with which the two factors, time and watts, are measured. If a stop-watch is used the possibility of both a stop-watch error and a personal error of the tester is present. If rheostats are used it is difficult to hold the load constant to within two- or three-tenths of 1 per cent throughout the test because of variation in the supply voltage.

Precise timing and constant loading

To eliminate the source of error in timing, the new board was designed so that the time of test can be automatically and precisely limited to a predetermined period by means of a time-control device driven by a synchronous motor which automatically closes and opens the potential circuit of the standards. To obtain a constant load an electronic current regulator which maintains the load to within about 0.05 per cent of the original setting was designed and incorporated.



Circuit holds watts constant for portable standard test

From main load resistors *L* the current is stepped up through phantom transformer *T*. Variation in line voltage changes position of shutter through control wattmeter W_c, regulating the amount of light falling on a light-sensitive cell. More light falls with a rising voltage and less when it drops.

The output of the cell controls the impedance of the shunt circuit by means of electronic current regulator (lower circuit). Variable resistor R_1 is set to give about 10 volts at transformer T_1, which has two 360-volt secondary windings connected to plate circuit of two type 10 triodes. (Two tubes used to obtain full wave action.) Impedance of 10-volt windings varies with impedance of plate circuit. Impedance of plate circuit is affected by change in grid potential imposed by the light-sensitive cell through bridges *A* and *B*, which are supplied from a separate 300-volt rectifier source.

Output of cell is amplified by type 56 tube in *B*. Grid circuit of 56 (connected across center points of *A*), and plate circuit constitutes one arm of *B*. Proper negative bias obtained by adjusting potentiometer rheostat (arrow at *A*).

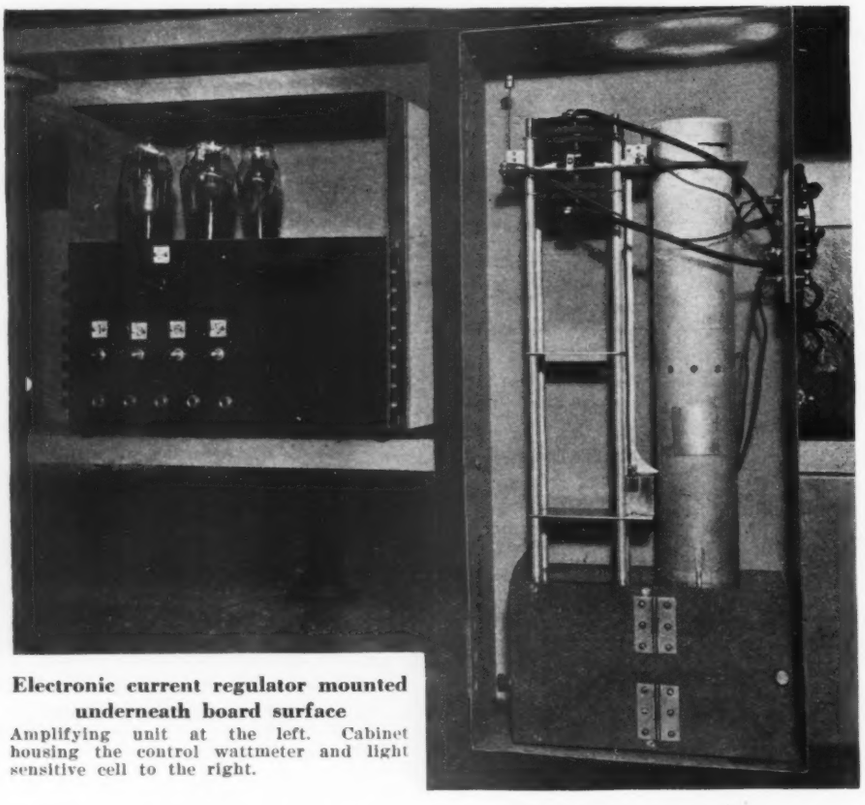
Partly to compensate for the magnetizing current in the 10-volt winding of T_1 and to bring the power factor of the shunt circuit near unity a condenser is connected across the two 360-volt windings.

The action of this constant load feature will be understood by referring to the schematic wiring diagram, where *L* is the usual resistance for setting the approximate load and where *T* is a phantom transformer for stepping up the test circuit current.

In this test circuit, along with the portable test standards under test and the precision wattmeter W_s, is a control wattmeter W_c. The potential coil or armature

New automatic test board

Amplifier instruments and time control are seen above the two indicating wattmeters. Load setting controls are seen below in foreground.



Electronic current regulator mounted underneath board surface

Amplifying unit at the left. Cabinet housing the control wattmeter and light sensitive cell to the right.

of this control wattmeter is pivoted at both ends and actuates the vertical shaft and damping vane. To this shaft is fastened a shutter, which, in responding to normal power variation due to voltage change, controls the amount of light falling on a light-sensitive cell which electronically controls the impedance of a shunt circuit. The movement of the light shutter is blocked so that at one extreme position it is wide open, and in the opposite extreme position it is just closed. Whenever the voltage starts to rise the shutter allows more light to fall on the light-sensitive cell. The output of this cell, through an amplifying unit, lowers the impedance of the shunt circuit, diverting current away from the meter circuit through transformer T and restoring the watt load to the original set value.

The control wattmeter W_c obtains its counter-torque from a balance weight in place of the usual spring. Its potential coil is connected to the line through the two pivots, which are immersed in mercury to insure permanent contact. When under control the actual movement of the shutter is about 1/64 of an inch and represents a change in load of about 0.05 per cent. The position of the counter-balance weight would, if not prevented by the stops, allow a wide range of the wattmeter armature movement with an exceedingly small change in torque.

Test procedure simple

The general test procedure is to set the load resistor L to a value which will result in a little more than the desired power load on the standards. The amplifier is then placed in operation. This automatically shunts around the standards just enough current to start the automatic control and a constant load is thus held. The exact load is then set by means of resistor R_2, which is in series with the potential element of the control wattmeter.

Each side of the board has sixteen test positions, and provisions are made for testing 25- and 60-cycle standards at unity and 0.5 power factor, and at loads from 0.25 to 75 amp. at various standard voltages. The various voltages, loads and power factors are obtained by means of a selector switch, which makes all the internal connections. A multiple ratio current transformer, not shown on the diagram, supplies the different loads. The current transformer error is eliminated for all loads as the indicating wattmeter is always connected directly in series with the standards.

The board is of the "dead-front" type, as shown in an accompanying illustration. The only instruments located on the board surface are the two precision wattmeters, against which the standards are automatically checked, all auxiliary apparatus being placed below the surface of the bench in easily accessible positions for maintenance. The board is provided with an independent, indirect lighting source.

The combination of these unusual features in this board has proved to afford increased accuracy and speed in testing.

Balancer Reduces Dips on Four-Wire Secondary

By ROBERT D. WILDER
Assistant Engineer Distribution
Public Service Electric & Gas Company, Newark, N. J.

EXTENSION of underground network distribution by the Public Service Electric & Gas Company to business districts of smaller cities and towns occasionally leaves a dead-end street or isolated area cut off from the overhead distribution system. It has been found economical to feed such areas (Fig. 1) from the three-phase, four-wire network secondaries.

Voltage dips from starting of 120-volt household appliance motors on such secondaries, however, produce quite a design problem. Cabled secondaries were considered and are still being studied; however, service taps are rather difficult to make, and suitable suspension at the pole is a problem. Satisfactory insulation and sheathing for such cabled wires remain to be developed and tested, so another answer to the dip problem was required.

Messrs. Jacquith and Fiedler (ELECTRICAL WORLD, March 24, 1934) had arrived at one solution to the dip problem on single-phase secondaries by the use of the two-to-one auto-transformer connected at the end of the single-phase secondary. If such a device could be applied to the three-phase, four-wire secondaries an economical solution might be reached. The minimum amount of secondary rebuilding would be required on the change to three-phase, four-wire operation. Such a device would be inconspicuous and low in maintenance cost.

Two connections were suggested,

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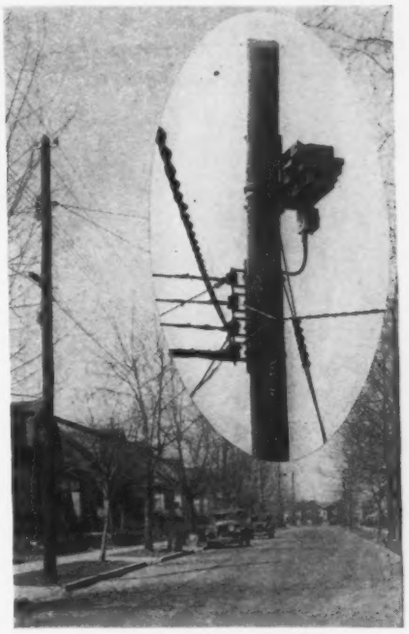


Fig. 1—Balancing transformer installed at far end of dead-end street secondary

Three-phase, four-wire secondary has balancer (insert) at the remote end.

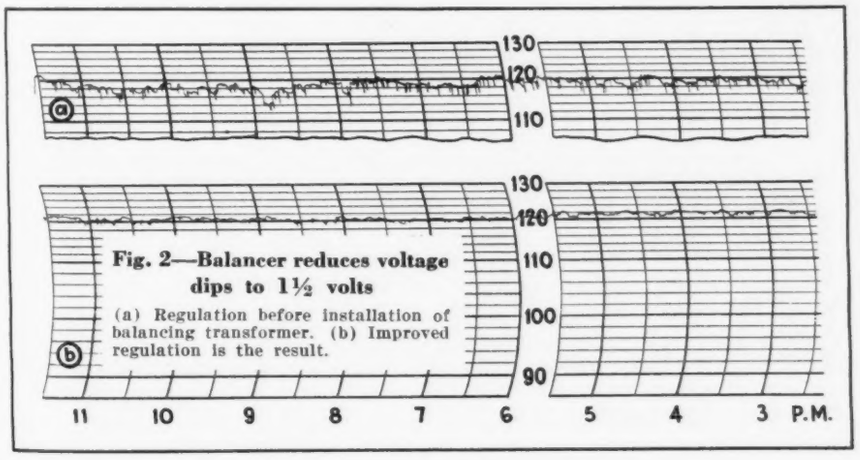


Fig. 2—Balancer reduces voltage dips to 1½ volts

(a) Regulation before installation of balancing transformer. (b) Improved regulation is the result.

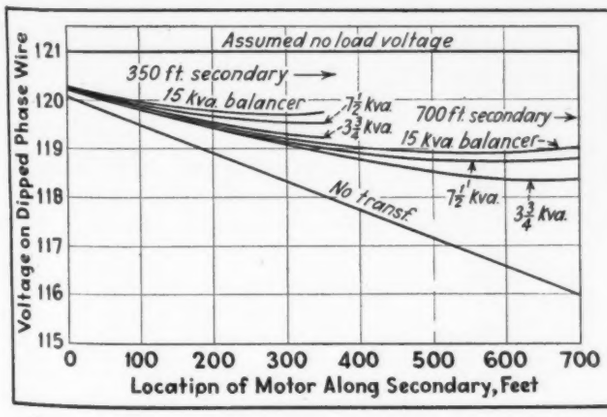


Fig. 3—Effect of balancing transformer on No. 1 three-phase, four-wire secondary

Six-inch spacing. Fed by 75-kva. network transformer.

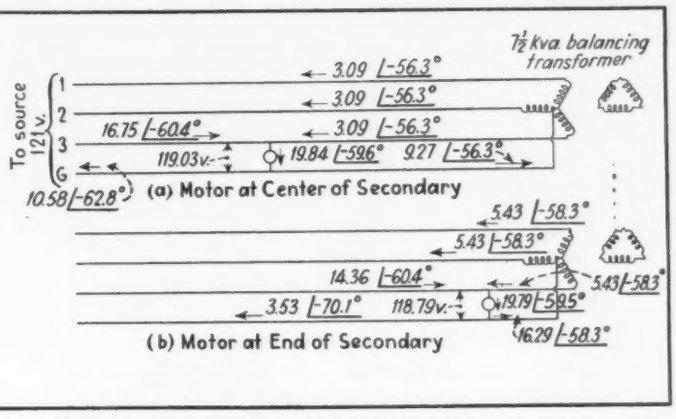


Fig. 4—Current flow calculated for 20 amp., 50 per cent power factor load

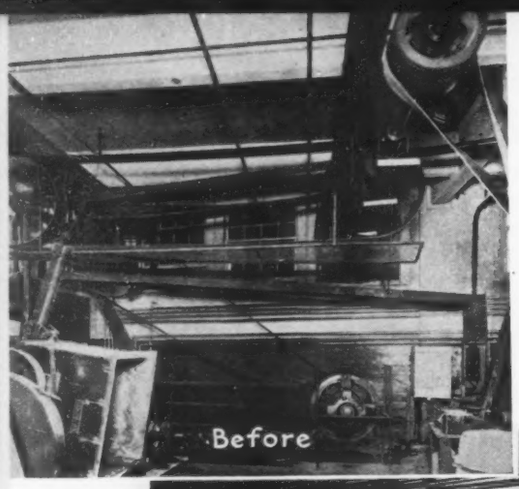
120 volts; 700 ft. No. 1 open-wire secondary at 6-in. spacing.

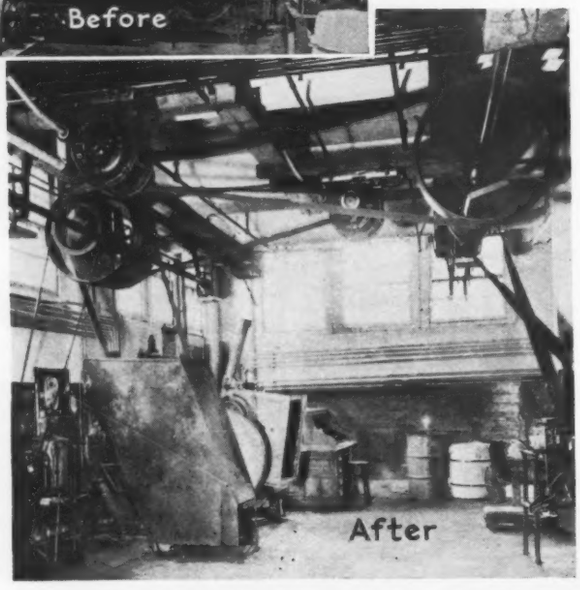
Reduce Horsepower

By CHARLES MICHAELS . . . ROBERT S. ANTHONY

Consulting Engineer *Plant Manager, Wallace & Company*

Brooklyn, N. Y.

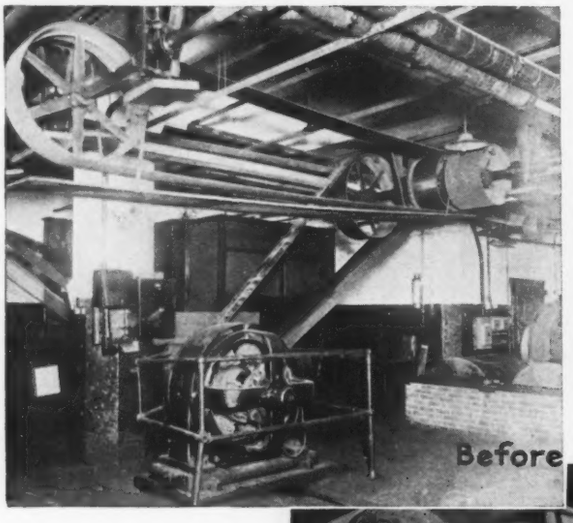


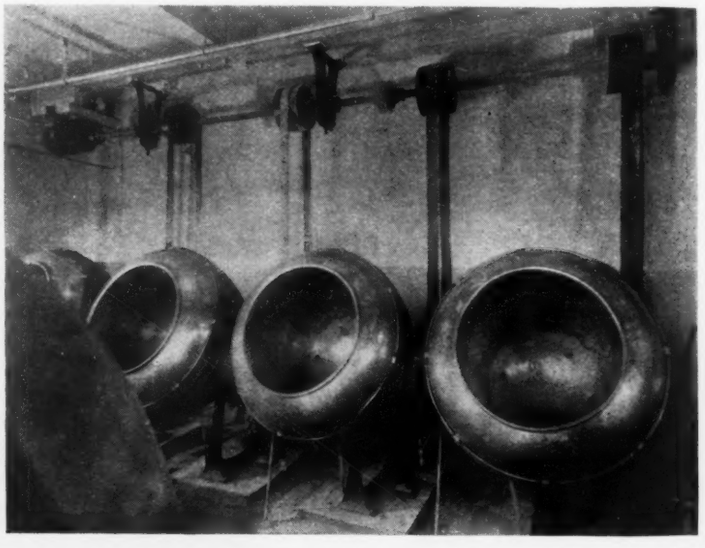


Separate 10- and 15-hp., 900-r.p.m. squirrel-cage motors each driving a line shaft replaced a 50-hp. motor in the basement which drove both of the shafts through a jackshaft. Eliminated jackshaft and 12 hp. in belt and shaft losses

With alternating current newly available in their territory, Wallace & Company, manufacturing confectioners of Brooklyn, took its availability as an opportunity to modernize completely the electrical phases of its operations. The resulting economies have brought this company a saving of $2,500 annually—a return of 12½ per cent on the investment.

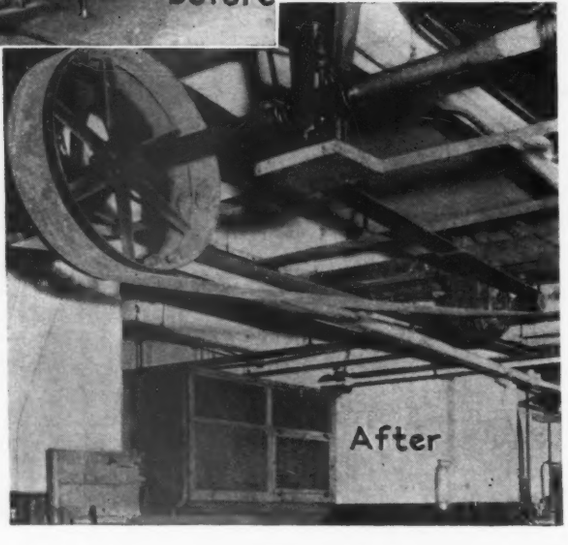
Power for the factory's 500 hp. in motors had been previously supplied by two 125-kw., 110/220-volt d. c. generators driven by reciprocating steam engines. Steam for these engines and for process requirements was supplied at 105 lb. pressure from two hand-fired boilers, each requiring an attendant. Monthly electrical requirements of the plant were estimated to be 240,000 kw.-hr., at an average maximum demand of 125 kw.





Four Dragee pans belted to a shaft directly coupled to a 2-hp., 61-r.p.m. squirrel-cage gearmotor

A 15-hp., 720-r.p.m. squirrel-cage motor replaced a 50-hp. motor in the basement. The 50-hp. motor was belted to one line shaft that drove another. About 7.5 hp. was lost in the first shaft which was taken down. The motor took its place on the ceiling



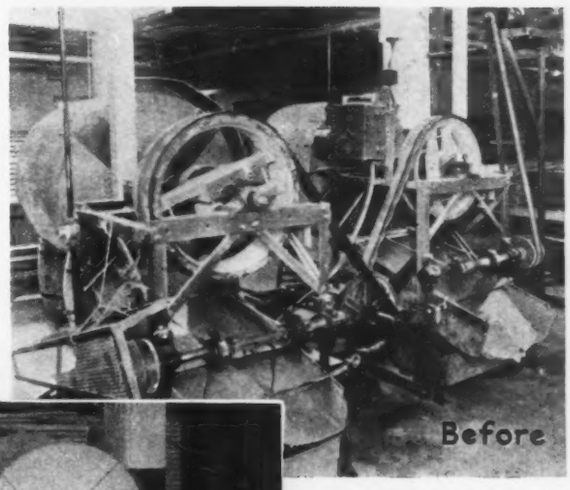
Although the existing plant could have been operated for about five years without plant expenditure, at the end of that time a considerable investment would have been neces-

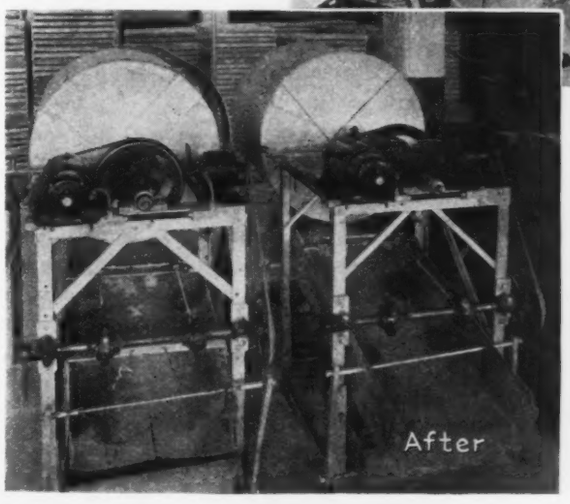
40%—Save $2,500 Annually

sary to replace obsolete equipment. A long-time view of operating economy therefore dictated the change to a.c. operation. It was found that process steam requirements could be satisfied with one boiler operating at 85 lb. pressure. This, in addition to increasing the life of the boiler, allowed one of the boiler attendants to be shifted to more productive work in the maintenance department.

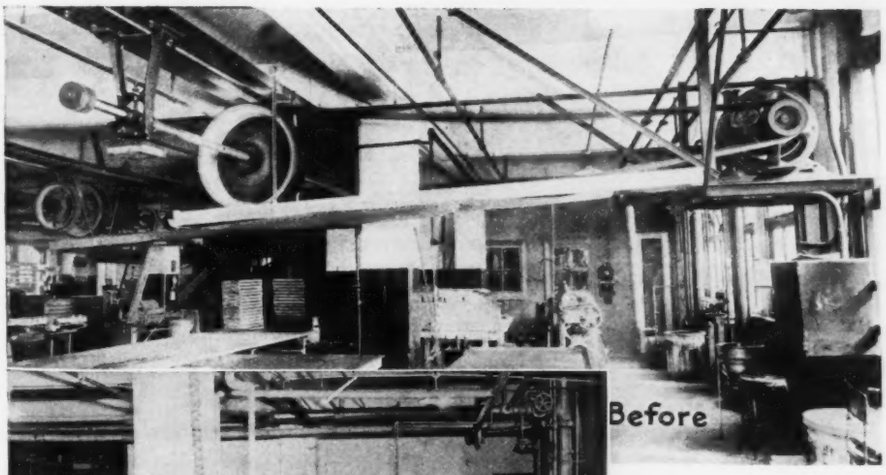
In the course of the replacement of d.c. motors certain existing group drives were retained and modernized where it was found that their operation offered operating advantages over individual drive. In other cases group drives were replaced by individual drive where driven machines were numerous, small and infrequently operated. Total plant horsepower was reduced in the course of the change from 500 hp. under d.c. operation to 300 hp. with a.c. operation. Some of the more outstanding instances of improvement in drive conditions are portrayed in the accompanying illustrations. All motors are of General Electric make.

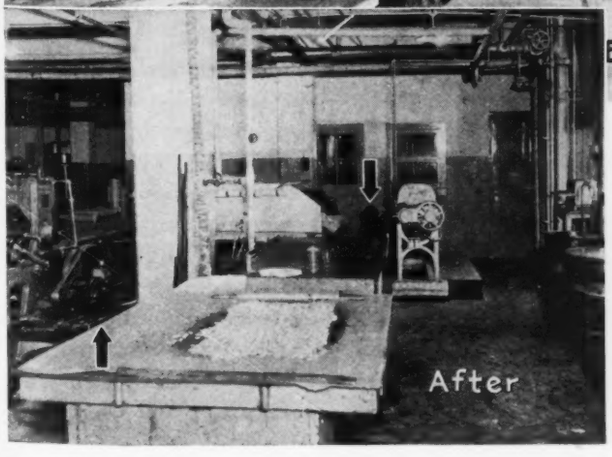
Six months of a.c. operation indicate an average monthly energy consumption of 130,000 kw.-hr. with an average maximum demand of 128 kw. The average monthly saving in operating costs is about $200. This plant is served at 208 volts, three phase, 60 cycles. There is no power-factor clause in the power contract.





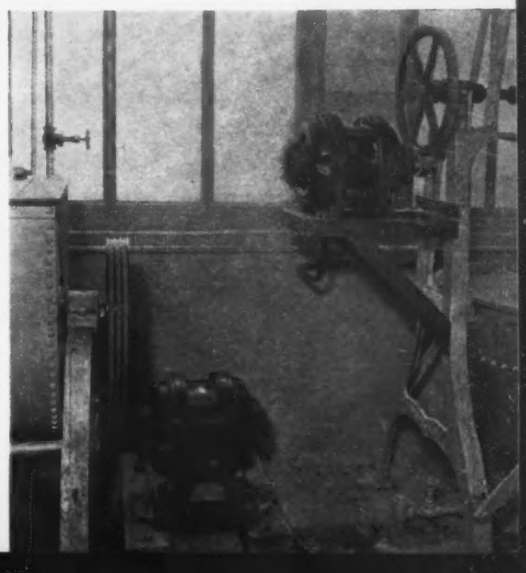
Tumbler and shakers before and after remotoring. Two 1/3-hp., 90-r.p.m. gearmotors and two ¼-hp., 1,725-r.p.m. motors replace three d.c. motors totaling 4 hp. Note how the use of gearmotors cleaned up the appearance of these machines





On one of the floors shafting, driven by a 25-hp. motor, was replaced by individual drives totaling about 15 hp. Machines on this floor, unlike those in the basement, did not operate all at one time. At times only one or two small machines on this floor are operating

Two mixing kettles operating at different speeds have their speed requirements satisfied, one with a V-belt and a two-speed motor and the other with a 1,200-r.p.m. motor geared to the kettle. Both motors are 2 hp.



Editorials

S. B. WILLIAMS, Editor

Lower Costs for Adequate Rewiring

THE drive for adequate wiring is on. Local participation in the program of the national bureau is growing rapidly. Interests outside the electrical industry, such as women's magazines and architectural and building publications, are giving it active support. More people are hearing about adequate wiring now than ever before.

From the standpoint of new construction the effect should be most quickly discernible. Builders are quick to sense a public demand.

The biggest market, however, and the biggest problem, is with the old home. The industry promotion and all the forms of publicity that are being directed toward this market are bound to put the home owners in a receptive mood, but the actual selling must be made by personal contacts.

Who is going to do the selling, how much selling cost can be allowed, who is going to do the installing, and on what basis, are all matters to be worked out carefully. Equally serious is the problem of cost of rewiring, but as ways were found of licking the cost of range wiring, so methods can be found materially to reduce rewiring costs.

Some people think that new materials are the answer. If substantial savings can be secured through the use of new materials that are safe, a market for their use will soon spring up. Savings from materials alone, however, are bound to be small as compared with savings from efficiency of handling the work. The big cost in rewiring is going to be the labor, supervision and planning. While in many respects it will involve operations similar to old house wiring, it injects a new problem of utilizing the old wiring to best advantage and tying the added circuits in with the old.

It will probably be found that to secure the lowest costs both the selling and installation will have to be done on a mass or production basis. With it there will probably have to go some sort of central layout service, so that all the electrician will have to do is follow the plan. There is no reason why, in that fashion, adequate rewiring cannot be sold for considerably less than it now costs—and at a profit.

Blue Ribbon Portables Add Decoration to Utility

AT THE Chicago and New York lamp shows this month the new "Blue Ribbon" lamps are being shown. They represent the latest step in I.E.S. lamp design, namely, the addition of decorative effect to sound illuminating engineering. The lamps are the winning designs in the recent contest held by the American Institute of Architects, the American Institute of Decorators and the Illuminating Engineering Society.

The I.E.S. lamp has made history in the portable lamp field. In the little over four years it has been available the volume, according to Electrical Testing Laboratories, lamp tag sales has reached 3,139,000 lamps. To this figure must be added those lamps of the I.E.S. type for which no tags were purchased, which would probably bring the total well above 5,000,000 lamps.

The I.E.S. lamp has been the focal point in selling better lighting to homes. It has been instrumental in arousing a better public consciousness of what constitutes good reading light. Nevertheless, the lamps, while by no means unpleasant to look at, have not aroused any great amount of enthusiasm on the part of the non-electrical dealer, the housefurnishings and department stores. For them the utility of the lamp was secondary if it lacked merchandising appeal.

Well, now they have it in the "Blue Ribbon" line, and the sales at the Chicago show would seem to indicate that they like it. If these non-electrical retail stores add their sales strength, and they have been the largest outlets for lamps, to that of the utilities in selling these higher wattage portables, the effect on the load curve will be substantial.

•

Fall Business

LAST WEEK Consolidated Edison Company placed orders with four manufacturers for five hundred thousand small appliances valued at $3,500,000. These orders are the first of four or more for merchandise to be used in a fall co-operative campaign. They are reported to be the largest of their kind ever placed.

At the same time from the other side of the country the Rocky Mountain electrical interests reported plans for taking part in the National Sales Crusade to break the summer slump—with all interests co-operating.

These are not isolated examples, for plans are being made in other parts of the country for fall drives. They are cited merely to give emphasis to the fact that business will be good this fall, especially for those who make it good. Also, which is equally important, sales drives stimulate optimism, which in turn will materially improve the morale of the entire working force.

Cracking the Whip on San Francisco

THE man who is sole judge as to whether a municipality has offered a utility a fair price for its property before permitting that city to secure PWA funds to erect a competing system is the same man who is withholding a hundred million dollars from San Francisco in order to force it to buy out the local utility—Secretary of the Interior Ickes.

San Francisco gets water and power from the Hetch Hetchy reservoir, which is located on land donated by the federal government. In granting the use of this land it was stipulated in the Riker Act of 1913 that none of the water or power should be sold to any private company for resale. During these years, however, the energy from this project has been distributed by Pacific Gas & Electric Company. The city claims that the company merely acts as its agent because it has no distribution system. Secretary Ickes holds that the energy is being distributed contrary to the provision of the Riker Act. The federal court has recently granted an injunction against the city, effective December 28, which would deprive the city of more than $2,000,000 revenue from the sale of this power. Several times the voters have refused to approve a bond issue to provide for a municipal electric system.

The Secretary of the Interior has been determined that San Francisco shall engage in municipal operation of electric service. That the citizens don't want it and have said so repeatedly is of no consequence. He has demanded referenda, and when they failed he went to the courts. And now, although he has secured an injunction, he is not satisfied, but must withhold PWA funds until the city has capitulated.

If PWA funds can be used as a whip to force municipal operation in San Francisco, what is to prevent similar misuse of this power elsewhere?

•

A Plan to Discourage Convention Room Parties

ONE of the pernicious practices that have sprung up at conventions is the promiscuous and competitive room entertainment. It has hurt attendance at sessions and has not been particularly profitable for those footing the bill.

In an effort to discourage this practice the Canadian Electrical Association at its annual convention last month experimented with a co-operative club, the expenses of which were shared by the association and the manufacturers on the basis of 25 per cent and 75 per cent. The club, which provided centralized entertainment quarters, except for session periods, was open throughout the day and until a reasonable time at night. It offered a comfortable place not only for relaxation but for meeting and getting better acquainted with others attending the convention.

The experiment was decidedly successful in accomplishing its major purpose. For small meetings, such as state and regional, particularly where they are held at some resort, the plan has much to recommend its adoption. It will do more than anything else to bring the people together.

•

Self-Selling in Farm Service

THE customer who buys what he has sold to himself is usually the most satisfied customer—and he makes the best salesman. It takes rather special conditions and circumstances for the effective employment of this very elemental sales principle. That these conditions and circumstances do very commonly exist in the field of farm electric service appears to be proved by the experience with demonstration farms by the Public Service Company of Northern Illinois, as related in this issue.

Of course it may not be contemplated that every farmer can hope to have his place completely electrified in the idea that it will serve as a demonstration to his neighbors. All farmers cannot be demonstrators because there would then be no demonstratees. But the number of instances of complete farm electrification is still so small in comparison with the potential market that the demonstration method of selling can be very largely extended before it reaches the end of its usefulness. As a matter of fact, if the utilities and the manufacturers of equipment and appliances could get together on a co-ordinated plan of demonstration installations it is quite probable that a very large farm market would be immediately opened by that alone, quite aside from the increased buying that would result from the demonstrations. And it would be a logical and accepted development that as the number of demonstrations increased the price concessions to them would be currently reduced and the cost of this special kind of selling progressively be cut down.

We do not know that the Public Service Company of Northern Illinois had any idea of such a development as this when it started establishing demonstration farms. Nor do we know that the company entertains any such notion now. Perhaps the thought is too fanciful—too much like Mark Twain's shipwrecked people flung up on a barren island who managed to keep themselves alive by taking in each other's washing. But with a potential market of several million farms in the country, there ought to be a few hundred thousand that it would be good business to sell at little or no profit on the demonstration basis.

M.O. Pump-Priming Joker

By CARTER FIELD

The background to Washington news being always much more exciting and frequently more informative than the news itself, Mr. Field's long journalistic experience makes his personal interpretations not only interesting but authoritative.

THE "Dear Alben" promise is now redeemed. No "relief" funds are going to be advanced to any city to construct a municipal electric distribution system, or power plant, unless the existing privately owned company is so determined to continue its career of profit making that it will not sell out to the city at a "fair" price!

And who is to determine what is a "fair" price? Harold L. Ickes, Secretary of the Interior and Public Works Administrator. What could be fairer than that? Isn't Ickes called "Honest Harold" all the time in the public prints? True, he does have something of a reputation as a baiter of the electric industry, and of industry in general for that matter. In fact, if it weren't for the advertising Arthur E. Morgan has given David E. Lilienthal, it is probable Ickes would be ranked as the No. 1 Utility Baiter of the whole country.

Barkley's promise

What was this "Dear Alben" promise?

Toward the close of the last session of Congress there had developed, even among some perfectly loyal Democrats, a sentiment for "letting the cattle put on a little fat," as it was so aptly phrased by John Nance Garner. Senator Pat Harrison, chairman of the Senate finance committee, had led those holding this view in a battle to revamp the undistributed profits tax, and the capital gains tax, as a result of which the President had taken one of the soundest spankings he has had to submit to from a generally docile Congress. The general sentiment was that if the government would stop heckling and bedeviling business private industry might get somewhere, private employment might pick up, and finally that the government would be able to stop plunging into the red at such a terrific rate.

So when President Roosevelt, after a budget-balancing detour for a few months, which nearly drove Tom Corcoran, Harry Hopkins, Marriner Eccles and a few of the spenders to drink, turned back on his main highway again, and asked for more billions for relief, Congress gave him a big surprise. It actually began to consider the merits of the bill! It was willing to spend to prevent human suffering, but it hesitated about monumental public works, and especially public works of a character to scare business to death again, and to discourage private capital being poured into industry, thus providing employment.

So an amendment was proposed which would have prevented the loaning or granting of any of these "relief" funds to localities which wished to construct electric plants *if* the communities were already served by privately owned utilities.

It appeared likely that the Senate would pass this amendment. It also appeared likely that the House would accept it. Capitol Hill was in favor of "letting the cattle put a little fat on," cattle in the Garner phrase of course meaning business.

Senator George Norris and John Rankin, who tries to out-Norris Norris in the House, were in a blue funk. The President was told he would have to yield a little, that he would never be able at this stage to accomplish what Tommy Corcoran slipped over in the so-called "compromise" on the holding company death sentence. He was told the boys up on the Hill were actually reading the Brain Trust-written language now, looking for jokers.

So Senator Barkley of Kentucky, Democratic leader of the Senate, arose on the floor after a visit to the White House and "promised."

There was a great to do about carrying out the promise. "Honest Harold" got back from his honeymoon, promptly announced 1,776 PWA projects, not one of which was for an electric project of any type! We were waiting for "determination of policy."

He announced some more projects approved, and still no electric projects. Congress had gone home. There was no stalling to fool it. But Honest Harold himself was worried. He thought maybe the Barkley promise meant something. Then he saw the President—found out he —Ickes—was to be the judge as to whether the price was fair, and that he could loan and grant to his heart's content if he didn't think so.

It was a great day for Norris and Rankin!

•

Morgan's Suit Worries TVA Directors

Word from the Tennessee Valley, where five senators and five representatives, composing the TVA investigating committee appointed by Congress, are looking over the project, is that David E. Lilienthal and Harcourt A. Morgan are not worried about anything this committee may uncover, or that Dr. A. E. Morgan may be able to get into the headlines of the country's newspapers, but that they are worried sick about the latest move of Dr. Morgan. That is his suit to compel payment of his salary as a member of the Tennessee Valley Authority, and to force recognition of his contention that he is still chairman of TVA. In short, as General TVA Counsel Fry complained to the newspapers, it is nothing short of a "defiance of the President."

No one thought it was anything else. Federal Trade Commissioner Humphreys defied the same President in the same way. He didn't live to see his victory, but eventually the Supreme Court decided *unanimously* that the President had had no right to "fire" him.

Why the Lilienthal crowd is not worried about the congressional investigation is fairly obvious. They think Lilienthal has already proved himself much cleverer as a witness than Dr. Morgan. The committee

[*Continued on page 81*]

News OF THE WEEK

PWA Power Policy Will Prevent Duplication of Utility Facilities

Secretary Ickes to be judge of reasonableness of terms and conditions offered by municipality for private system before making funds available — Plan is in line with expressions made by Senator Barkley

PWA Administrator Harold L. Ickes set himself as the sole judge of the "reasonableness of terms and conditions" which a municipality might offer for the purchase of existing utility facilities before obtaining PWA funds to duplicate the system.

Last week Mr. Ickes, Secretary of the Interior, set forth the Administration's power policy in respect to the allotment of PWA funds for the construction of municipal utility facilities. These were in line with the expressions made by Senator Alben Barkley when the PWA appropriations were before Congress.

Must make fair offer

The PWA will make allotments to municipalities for power projects which would compete with existing systems only after the municipalities had satisfied the administrator that they had been unable, after reasonable efforts made in good faith, to acquire upon reasonable terms and conditions the facilities of the existing private utility with which the applicant might otherwise be in competition, Mr. Ickes said.

It was further pointed out by Mr. Ickes that this policy and the purpose of the condition is not to cause or induce any existing privately owned utility to sell its facilities, but merely to provide that no funds shall be advanced upon any application unless the utility shall have had an opportunity to sell, at a fair and reasonable price, when the utility would otherwise be substantially duplicated by the municipality.

This policy does not apply, Mr. Ickes said, where a proposed public project does not duplicate any severable part of a private utility system for which the applicant could reasonably make an offer to purchase. "Nor does it apply to extensions of an existing municipal plant, nor for projects generating, transmitting, or distributing power to be used substantially solely for the proprietary needs of the municipal agency and not to be sold to the general public in competition with the private utility," he said.

Loans to construct generating or transmission facilities for serving municipal projects which may theretofore have purchased power from a utility do not come under the restrictions of the PWA policy.

PWA has a big program based on projects released from injunctions by the Supreme Court earlier in the year. These projects and others are expected to get the continued attention of Mr. Ickes. Of ninety projects released from injunctions, seventy are now under way and construction is to start soon on the others. More than 274 electric projects costing $218,000,000, of which $144,000,000 constitutes grants and loans, are included in the PWA program.

•

Kellogg Challenges Power Plan Concept

The government's power policy was characterized as equivalent to burning a barn to get roast pork by Charles W. Kellogg, president of the Edison Electric Institute.

Speaking before the twelfth annual Virginia Institute of Public Affairs last week, Mr. Kellogg challenged the basic concepts of the Administration's power policy. The vast federal expenditures for power development, he said, are disaproportionate to the public advantages resulting from them.

Threat of government competition has already produced staggering losses in security values to millions of investors who have contributed to the utility industry, which is largely under government regulation, Mr. Kellogg said.

"When we compare the total tax burden of our country with the cost of electricity in the home, it would seem pertinent to inquire if the instrumentality that imposes these taxes could not be of more help to the citizen through lightening the tax burden than through spending his money in such vast sums on such a relatively trifling part of his budget."

Mr. Kellogg said that the average citizen pays an annual electricity bill of only $33.81, and a 6.4 per cent reduction in governmental expenditures would be equivalent to wiping out the entire electric bill in the average citizen's home.

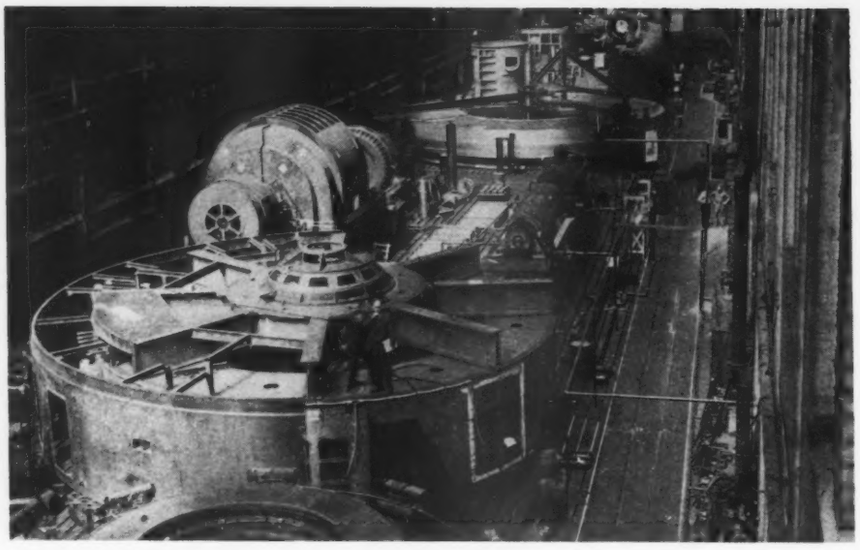
•

Set New Policy for Rural Line Approval

Investigation of possible interference with existing telephone lines or other utilities will be made before the approval of future rural electrification lines, according to Thomas W. Ozlin, chairman of the Virginia Corporation Commission.

New policy grew out of a protest lodged by the New Castle Telephone Company that the Craig-Botetourt Electric Co-operative line would set up electric interference with its own service. The commission later dismissed the complaint after a test by the telephone company showed that its service would not be impaired.

Approximately 250 customers are being served by the Meadow Creek Corporation through the co-operative and plans are under way to connect an additional 750 homes in the near future, according to S. C. Foster, chief engineer of the power corporation.



POWER IN THE MAKING—One of the 45,000-kva. waterwheel generators for the Pickwick Landing dam of the TVA under construction in the East Pittsburgh works of Westinghouse Electric & Manufacturing Company. It is due for shipment soon

Power System Offer Made by Chattanooga

Conversations looking toward the sale of properties of Tennessee Electric Power in Chattanooga will be resumed in the near future between David E. Lilienthal, power director of TVA, and Wendell L. Willkie, president of Commonwealth & Southern.

Last week Chattanooga offered $6,200,000 for the transmission and distribution facilities in the city. Acting Chairman Wilhoit of the Chattanooga Electric Power Board wrote Mr. Willkie that the price to be paid for usable generating facilities would be determined on the basis of original cost lest depreciation as established by auditors' report and engineers' survey made under the joint auspices of Commonwealth & Southern and TVA.

Mr. Wilhoit said that the offer was a last effort to buy the facilities before the city proceeded to construct a duplicate system.

Mr. Willkie characterized the proposal as "an unfortunate interference in the current negotiations" between TVA and his company for purchase of the properties in a certain defined area.

"Obviously the Tennessee Electric Power Company could not sell its property piecemeal without great loss to the security holders," Mr. Willkie said. "Obviously also the Chattanooga threat of duplication of our properties with money, a large portion of which is given to it absolutely free by the federal government, creates a situation where pressure is placed upon us to negotiate for less than a fair price."

Mr. Willkie pointed out that he had offered during the last four years to sell the properties in the TVA area. He said that he hoped that the Chattanooga Power Board will not insist upon duplicating the existing distribution system. "Insisting on such a course," he said, "would, as J. D. Ross, Federal Administrator of Bonneville Dam project, has repeatedly stated, result in destructive competition, with increased cost finally to the rate and taxpayers of Chattanooga."

Jo C. Guild, Jr., president of Tennessee Electric Power, said that he was thoroughly in accord with the statement of Mr. Willkie. He said that the offer was an attempt to "beat us below a fair price" for the properties.

•

Utility Adds Rural Lines

Some 750 miles of lines for rural electrification have been built by the Appalachian Electric Power Company in the Bluefield district, embracing four counties in West Virginia and twelve in Virginia, at a cost averaging $1,300 a mile, according to J. P. Gills, district manager.

•

Leagues Join Sales Drive

Five electrical leagues are participating in the National Salesmen's Crusade sponsored by Nash-Kelvinator Corporation, according to the International Association of Electrical Leagues. These are: Essex Electrical League, Electric Association of Kansas City, Electrical Association of New Orleans, Rocky Mountain Electrical League and Passaic County Electrical League.

Congress Group on 6-Day TVA Tour

As TVA and government officials this week ponder the suit filed by Dr. Arthur E. Morgan, ousted TVA chairman, Senator Vic Donahey and his joint Congressional committee, named to investigate the government power experiment, started on a six-day, 800-mile automobile tour of the dams and properties.

David E. Lilienthal, director of TVA power program, and Harcourt A. Morgan, present chairman, headed the caravan to explain to the legislators the workings of the agency. Key employees of TVA accompanied the investigators to explain the features of TVA and see that all questions about the projects are answered. Three "directors of information" for the TVA, along with supplementary documents, were available throughout the trip.

Last week Dr. Morgan charged in his suit that "the attempted removal by the President of the United States is wholly invalid, void and of no effect whatsoever." Dr. Morgan sought to be "recognized as chairman and member of the commission" and asked back salary of $2,916.66.

The TVA legal staff and department of justice will seek to have Dr. Morgan's suit transferred from the state chancery court to the federal court and will fight the suit.

The whole subject will come before the Congressional committee when they return next week to Knoxville after the TVA tour and begin hearings. Senator Donahey said that the hearings would be open to the public and that the charges of administrative dishonesty and counter-charges would be cleared before the broader questions of public policy are aired.

Before departing on his speaking tour President Roosevelt conferred with the two TVA directors.

•

Plans Rural Construction

Arkansas Power & Light Company has asked the Arkansas Utilities Commission for permission to construct 36.7 miles of rural electrification lines in Columbia and Union counties, at an estimated cost of $24,220.

•

New Kitchen Plan Book

General Electric Company has issued a new kitchen planning book by the specialty appliance sales division at Nela Park, Cleveland. The book gives basic kitchen layouts and how to select equipment.

Knoxville Utility Prepares Plans to Sell Its Electric Properties

Stockholders approve deal with city and TVA — Faced with duplication of system Tennessee Public Service gives way to expanding TVA program — National Power & Light to sell all Tennessee units

Plans for conveying to TVA and the city of Knoxville electric facilities of Tennessee Public Service which face duplication moved ahead this week as stockholders of the utility approved, without protest, the sale of the properties.

Last week stockholders of National Power & Light, parent company, without opposition, approved by a 72.7 per cent representative vote the sale of the subsidiary property.

Terms of sale

Under the transaction Knoxville will pay $5,483,500, the TVA will take over outside lines for $2,541,500 and Appalachian Electric Power will pay $1,298,013 for the Waterville-Kingsport-Newport transmission lines. In all the Knoxville utility will receive approximately $9,335,000 for the properties, which have a rate base of about $9,017,000. When the sale is consummated the utility will have left its transportation properties, which it expects to sell later.

Discussing the sale, P. L. Sawyer, president of National Power & Light, stated that holders of 50,000 shares of preferred stock of Tennessee Public Service will receive approximately $70 a share. National owns 85 per cent of the issue. Holders of the $7,000,000 of 5 per cent bonds will receive 97½, as against the offering price of 96½. There will be no funds from the sale available for the 1,000,000 shares of common which are owned by National Power & Light.

Mr. Sawyer said that the funds National receives from its investment in the Knoxville utility will be used for normal corporation purposes or invested otherwise. He said that the loss of investment in the Knoxville property will be absorbed by present surplus.

Belief was expressed by Mr. Sawyer that deposit of Tennessee Public Service bonds would be completed before the deadline. He said that in the first two weeks $1,800,000 had been deposited and another $1,000,000 promised. At least 80 per cent of the bonds must be deposited under the plan before the sale can be consummated.

Depending upon the closing date of the sale before August 13, a bonus of $3,000 a day is offered to the utility. For each day after that date a decrease of $3,000 from the purchase price will be made. Transfer must be made before November 1 or the deal is off.

Mr. Sawyer said that with the completion of the sale National would retire from utility operations in the eastern area of Tennessee. He said that properties of Holston River Power Company will be sold to local power authorities. The situation in Memphis remains unchanged, but future conferences are to be held.

This week the Federal Power Commission held hearings on the transfer of the Knoxville properties in which the company and city officials joined in saying the deal was in the public interest. Mayor Mynatt said that the bonds to finance the purchase would bear interest at 3½ or 4 per cent and would be offered for public sale. The RFC had previously offered to take the bonds.

SELLS PROPERTIES—Stockholders of National Power & Light approved last week the sale of electric facilities of Tennessee Public Service in Knoxville. Left to right—Alexander Simpson, secretary; P. L. Sawyer, president, and E. B. Lee, vice-president

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Rural Lines Planned by New York Utility

Expenditures totaling more than $600,000 are included in the current rural electrification program of the New York State Electric & Gas Corporation.

Present plans call for spending $600,000 for lines, which will extend rural service 600 miles in up-State New York areas. Companies in the Associated Gas & Electric system in the state now serve more than 140,000 rural customers, of whom more than 33,000 are farmers.

The corporation estimates that today electrical service goes to more than 45 per cent of the farms in its area which might reasonably be expected to take it. Plans are already under way to extend service farther in the near future.

•

Follow Refrigerator Drive With Direct Mail Campaign

The Electric Institute of Washington has reported that more than 3,800 electric refrigerators, valued at more than $500,000, were sold during its recent refrigerator campaign. Almost 50 per cent of this dollar volume consisted of 1938 models, for which the average price was $179. Of the 1938 boxes, 31 per cent replaced mechanical refrigerators.

As its share in following up the campaign, Potomac Electric Power Company is now conducting a direct mail campaign to 20,000 owners of electric refrigerators five years or older.

•

Georgia Power Sales

Merchandise sales of the Georgia Power Company for the first five months totaled $659,737, or $4.13 per residential customer, an average of 83 cents a month. Mazda lamp sales for the same period amounted to 251,660, or 118 per cent of quota, while I.E.S. lamp sales dropped to 1,914, or 32 per cent of quota.

Los Angeles Signs New Power Contract

The Department of the Interior and the Los Angeles Bureau of Power & Light, after nine months of negotiations, have signed a contract under which the city will take 700,000,000 kw.-hr. a year of Boulder Dam electricity more than it does at present.

Contract calls for construction of a third circuit from city limits to dam to carry the additional power, which will be wholly secondary energy. Under the previous contract the city took 1,610,000,000 kw.-hr. a year over the two existing transmission lines.

The contract was made in anticipation of a legislative reduction in Boulder Dam rates to about 1 mill per kw.-hr. for firm energy and 0.3 mill for secondary energy, present rates being 1.63 mills for firm and 0.5 mill for secondary energy. While no rate reduction is made in the contract, provisions are made under which charges might be cut by later legislation.

A total expenditure of about $18,000,000 is called for in the contract. Last November the city floated an $11,000,000 bond issue to provide construction funds. New machinery at the dam, for which the city will pay over a period of years, will cost about $5,000,000.

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E.E.I. Group Proposes Electrical Code Changes

The proposals for changes in the National Electrical Code offered by the electric light and power group have been submitted by the Edison Electric Institute to Chairman A. R. Small, electrical committee, N.F.P.A., and through him to the entire committee. These proposals are not submitted for an interim revision, but for the next general code revision.

The proposed changes suggest the general use of covered neutral; thin wall insulation; bare neutral in conduit and tubing; modification of the 40 per cent conduit area rule to permit greater conductor use; removal of requirements for use of conduit in theaters, elevators and hazardous locations and metal-clad wiring in garages; and deletion of 10-ft. conduit rule.

Supporting statement is contained in a reprint of articles by President C. W. Kellogg of E.E.I., which appeared in ELECTRICAL WORLD of May 7 and 21.

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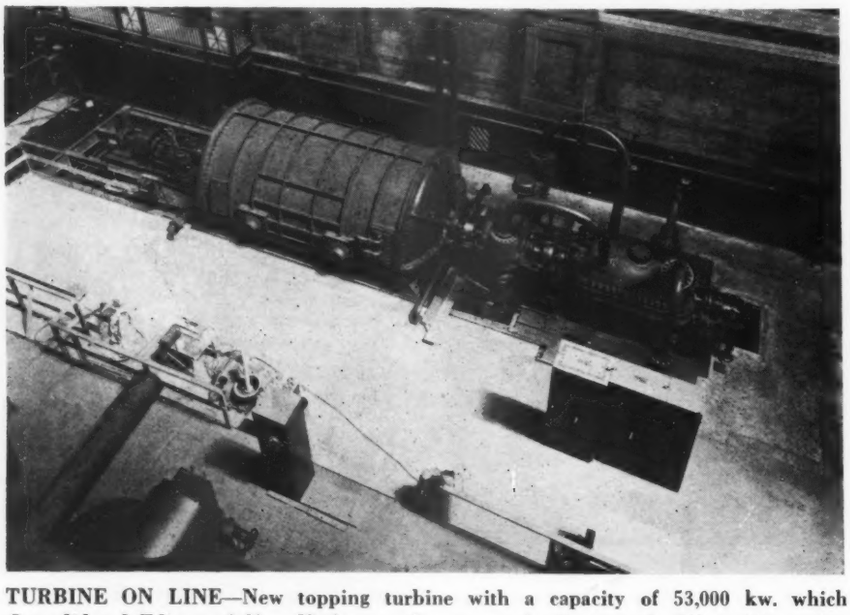
New York Utility Adds Topping Turbine Unit

Consolidated Edison Company of New York, Inc., on June 29 put on the lines at the Waterside station its second topping turbine. Manufactured by General Electric, the turbine is the second superposed unit installed at the station, the first having gone into service last year.

Known as unit No. 5, the turbine will have a capacity of 53,000 kw. Steam will be supplied by two boilers, each having a capacity of 500,000 lb. of steam an hour, with a pressure of 1,400 lb. to the square inch and a temperature of 900 deg. F. The steam will exhaust from the new turbine at 200 lb. to operate existing low-pressure turbines.

The new installation, like the earlier one, is expected to bring about a saving of 100,000 tons of coal annually.



TURBINE ON LINE—New topping turbine with a capacity of 53,000 kw. which Consolidated Edison of New York recently put on the lines at the Waterside station

A.S.T.M. Revises Test on Standards

An extensive revision of the standard requirements for bare stranded copper cable B 8 — 36 was made at the recent forty-first annual meeting of the American Society for Testing Materials, held in Atlantic City. The committee decided to continue the existing standard and also to have published the tentative standard B 8 — 38 T. The new tentative specification is sufficiently inclusive to warrant the withdrawal of the tentative specifications for hard-drawn copper transmission cable (B 87 — 32 T).

The society's committee B-4 on electrical heating, electrical resistance and electrical furnace alloys developed two new test methods, one covering temperature constants of sheet materials for shunts and precision resistors and a method for bend testing of wire for radio tubes and incandescent lamps.

F. M. Clark of General Electric proposed an oxidation test in which the oxidation of the oil is accelerated by the use of oxygen gas at 250 lb. per sq.in. pressure, the oxidation being carried out at 140 C. for a period of 24 hours. In his paper concerning studies in the oxidation of mineral transformer oil he said that sludge formation under certain conditions of oxidation appears to be closely related to the formation of free organic acid bodies formed as a direct oxidation product and to involve no chemical factors not present in the oxidation and sludging of the oil under atmospheric conditions at lower temperature.

In discussing this paper Herman Halperin of Commonwealth Edison said that a satisfactory stability test for transformer oil is an urgent need.

Changes in a number of standards were approved, including complete revision in the method of testing sheet, tape and molded insulating materials for dielectric strength. Four tentative standards are to be submitted to a letter ballot for adoption, including the testing of resistance of impact and the test for insulation resistance, also the method of test for grading natural mica and for testing molding powders used in manufacturing moded electrical insulators.

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Plan Fall Range Promotion

Low cooking cost is to be the theme of a range promotion campaign planned for October by the electrical range manufacturers of National Electrical Manufacturers Association. The activity is to be carried on through the Modern Kitchen Bureau.

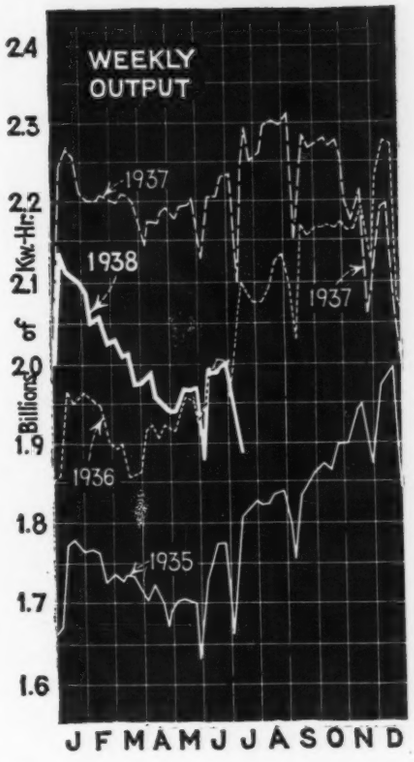
Holiday Lowers Week's Output

Movement parallels 1937, but on lower level — New England gains — West slackens

As usual, energy production by the electric light and power industry during the week including Independence Day fell off sharply, compared with the preceding full working week. It amounted to 1,881,298,000 kw.-hr., according to the Edison Electric Institute. The decrease of 133,000,000 kw.-hr. was somewhat smaller, however, than it was a year ago, although it was larger than in 1936, when the holiday fell on a Saturday.

The weekly movement continues parallel with 1937, but about 10 per cent lower. There has been remarkably little variation in that percentage during the past three months.

Regional figures show cross-currents. New England operations moved closer to the previous year's level than at any time since November. In the West Central area the gap decreased to 1.7 per cent, the smallest since February, with one exception, but in the West it has been widening, especially in the Rocky Mountain States.



Weekly Output, Millions Kw.-Hr.

1938	1937	1936
July 9..1,881	July 10..2,096	July 4..1,956
July 2..2,015	July 3..2,238	June 27..2,030
June 25..2,019	June 26..2,238	June 20..2,005
June 18..1,991	June 19..2,214	June 13..1,990
June 11..1,992	June 12..2,214	June 6..1,945
June 4..1,879	June 5..2,131	May 30..1,922

Per Cent Change from Previous Year

Region	Week Ending July 9	July 2	June 25
New England	− 3.7	− 9.0	− 8.5
Middle Atlantic	− 4.4	− 1.1	− 1.7
Central Industrial	−16.3	−16.5	−17.0
West Central	− 1.7	− 3.4	− 6.1
Southern States	− 6.5	− 9.1	− 9.2
Rocky Mountain	−28.4	−26.6	−23.4
Pacific	− 6.8	− 5.7	− 3.6
United States	−10.3	−10.0	− 9.8

Power Output in May Shows Decrease of 9%

Production of 8,839,887,000 kw.-hr. of electrical energy for public use during May, as reported by the Federal Power Commission, indicates an increase of 2 per cent over April but a decrease of 9 per cent compared with the same month a year ago.

Of the total, 3,803,340,000 kw.-hr., or 43 per cent, was produced from water power, as against 4,324,059,000 kw.-hr. a year ago, a decrease of 14 per cent. Energy generated from fuels amounted to 5,036,547,000 kw.-hr. as against 5,395,205,000 kw.-hr., a decrease of 7 per cent.

Because production has since December been consistently lower than in the like months of the preceding year, the twelve months' cumulative total has been decreasing. From a maximum of 118,080,000,000 kw.-hr. in November, 1937, it has fallen to 114,188,000,000 kw.-hr. for the period ended in May, virtually the same as it was a year ago.

Smaller output from fuels in May was accompanied by a reduction in the amount of fuel consumed, compared with May, 1937. Coal decreased 11 per cent to 2,786,987 tons, natural gas 3 per cent to 12,768,860,000 cu.ft., while consumption of fuel oil increased 14 per cent to 928,753 bbl.

•

June Output Off 7.7%

Net electric output of the Associated Gas & Electric system in June totaled 356,344,633 kw.-hr., a decrease of 7.7 per cent from June last year. This is said to be the largest percentage decrease in output for any month since September, 1932.

•

Standard Gas Directors

Seven directors were elected at a recent special meeting of stockholders and registered holders of notes and debentures of Standard Gas & Electric Company. These are as follows: Notes and debentures, Hamilton Pell; prior preference stock, George N. Armsby, Thomas J. Walker; common stock, James Bruce, Georges F. Doriot, Bernard W. Lynch and Thomas A. O'Hara.

•

Engineers Public Service Integration

A further step in the integration of Engineers Public Service Company was taken this week when the Securities and Exchange Commission approved a reorganization plan under which Baton Rouge Electric Company and Louisiana Steam Generating Corporation will be merged with Gulf States Utilities Company.

Donald C. Barnes, president of Engineers Public Service, also said this week that he was ready to discuss the transfer of Puget Sound Power & Light Company to public ownership. According to Charles F. Keiser, secretary of Public Utility District No. 1, Chelan County, Washington, all power districts in which the utility is operating hope to make an offer soon to purchase the company's properties.

In another order this week the SEC put a three-month limit on the $1,000,000 promissory note of the Associated Corporation, a subsidiary of Associated Gas & Electric Corporation, with the understanding that the applicant company be eliminated from the Associated system at an early date.

•

Insull Associates Pay Trustee in Compromise

Four former associates of Samuel Insull who were made defendants in a suit against directors of Insull Utility Investments, Inc., recently entered into compromise settlements under which they have paid $50,000 for the trustee of the firm.

Payments, as approved by Federal Judge James H. Wilkerson, follow: Walter S. Brewster, $25,000; Britton I. Budd, $10,000; Waldo F. Tobey, $7,500; Louis A. Ferguson, $7,500.

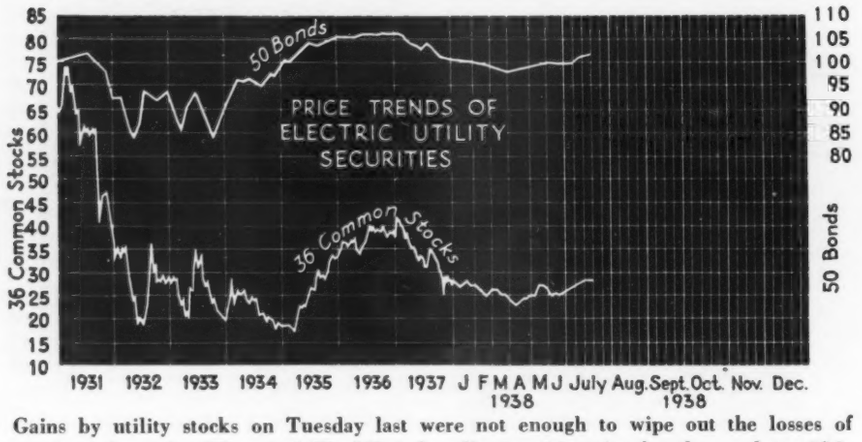
•

Florida Co-operative Given $30,000 by REA for Plant

The Rural Electrification Administration has allotted $30,000 to the West Florida Co-operative Association of Marianna to construct a generating plant for the farmer members to generate their own electricity.

Co-operative plans to build some 300 miles of line to make service available to 1,000 to 1,500 rural customers. REA had previously allotted $100,000 to permit construction to start on the project.

Utility Stocks Dip; Bonds Show Slight Gain


50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
36 Common Stocks
36 Common Stocks
50 Bonds
1931 1932 1933 1934 1935 1936 1937 J F M A M J July Aug. Sept. Oct. Nov. Dec.
1938
1938

Gains by utility stocks on Tuesday last were not enough to wipe out the losses of previous days, the "Electrical World" index dipping 0.2 point for the week to 27.8; index year ago, 32.9. Bonds showed slight gain, index moving up 0.3 point to 101.1

West Penn Files $17,000,000 Issue

West Penn Power Company has filed a declaration with the Securities and Exchange Commission covering the issuance and private sale of $17,000,000 of 3¼ per cent first mortgage bonds, series J, due August 1, 1968.

Proceeds of sale will be used to redeem $10,000,000 of 4 per cent first mortgage bonds, series H, due July 1, 1961, to pay bank loans of $5,300,000 and to provide for expenditures made or to be made.

Other filings with and decisions of the SEC follow:

Staten Island Edison Company filed declaration covering $2,000,000 of 4 per cent refunding and improvement mortgage bonds due July 1, 1939. Proceeds are to be used in refunding the same amount of 4 per cent bonds originally due August 15, 1937, and extended to July 15, 1938.

Louisiana Public Service Corporation has filed declaration covering $25,000 27-year, 6 per cent promissory note, due January 1, 1965, to be sold to its parent, American Utilities Service Corporation. Proceeds to be used for current and prior plant and property additions.

Minnesota Utilities Company has filed declaration covering issuance 2,000 shares of no-par common stock to its parent, American Utilities Service Corporation, for $56,000, proceeds to be used to discharge current interest obligations and increase its cash position.

Worcester Suburban Electric Company secured exemption from Utility Act of issue of 24,333 shares of capital stock, par value $25, to be exchanged for all of outstanding shares of $100 par value of Marlborough Electric Company, both companies being subsidiaries of Massachusetts Utilities Associates.

Puget Sound Power & Light Company secured authorization covering the issuance and sale of $7,000,000 of first and refunding mortgage 6 per cent bonds, series E, due October 1, 1950.

Hearing has been set for July 25 on the application of General Public Utilities, Inc., and the declaration of Dakota Power Company with reference to acquisition by General Public Utilities, Inc., of $250,000 of 7 per cent general mortgage bonds and $469,229 of fixed and cumulative income notes from Dakota Power, proceeds to be used solely for refunding purposes.

Hearing has been set for July 26 on application of Wisconsin Public Service Company for exemption from requirement for filing a declaration covering issue and sale of $2,500,000 of first mortgage bonds, 4 per cent series, due 1963, proceeds to be used for prior and future additions to property and plant.

Utilities who have recently filed on Form U-5-B, complete form for registration under Utility Act include: Eastern Utilities Associates, Engineers Public Service Company, El Paso Electric Company, Western Public Service Company, Pennsylvania Gas & Electric Company, United Light & Power Company.

NY PA NJ Utilities Company secured approval of its application to acquire 3,000 shares of common stock of Bradford Electric Company, all the outstanding capital stock, from Keystone Utilities, Inc., wholly owned subsidiary of the applicant, under a program which calls for the subsequent dissolution of Keystone Utilities.

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New Reorganization Plan

Mountain States Power Company and a preferred-stockholders' committee have jointly filed an application with the Securities and Exchange Commission for approval of a plan of reorganization of the utility. Another plan for reorganization previously was filed by a bondholders' protective committee.

•

Postpone Utility Stock Sale

New York Trust Company, as trustee for National Public Service Corporation 5 per cent debentures, has postponed until August 10 the sale at auction of 712,411 shares of common stock of Jersey Central Power & Light Company, collateral behind the debentures.

Rochester Gas & Electric Sells $1,657,000 in Bonds

Another step in the financing of the general construction and improvement program of Rochester Gas & Electric was taken last week with the offering of $1,657,000 of general mortgage 3½ per cent bonds due 1967, series I, at 104 and interest. The company received $1,690,140 from the sale of the bonds. The bonds are redeemable as an entirety on 60 days' notice at 108 before March 1, 1941, and thereafter at successively reducing premiums.

During the first four months this year the company had $1,260,499 gross capital expenditures.

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Columbia Votes Dividends

Columbia Gas & Electric Corporation last week declared the regular quarterly dividends on its three classes of preferred stocks. Dividends, aggregating $1,627,175, are to come out of net earnings since January 1, 1938, and are payable August 15 to holders of record of July 20. Announcement of dividend declarations followed SEC decision earlier in the week authorizing the company to make the disbursements.

•

Offers Ottawa Utility Bonds

A syndicate headed by W. C. Pitfield & Company, Ltd., offered last week $850,000 of ten-year serial bonds of Ottawa Light Heat & Power Company and $4,150,000 of 19½-year 4 per cent bonds due October 1, 1957. The serial bonds, redeemable $85,000 annually, will carry a coupon rate of 3 per cent for the first five years and 3½ per cent for the remaining five years. The issues will refund outstanding funded debt of approximately a similar amount.

Earnings Reports (Utilities)

	Net Income 1938	1937
*United Lt. & Pwr. and subs.	$4,547,568	$5,275,626
*American Lt. & Trac. and subs.	5,215,466	5,995,567
*Continental G. & E. and subs.	4,245,336	4,543,353
*United Lt. & Rwys. and subs.	4,840,637	6,286,453
*American Pwr. & Lt. and subs.	10,716,560	10,989,297
*United Gas Corp. and subs.	8,434,313	11,606,408
*Electric Pwr. & Lt. and subs.	7,433,323	9,248,975
†Standard G. & E. and subs.	1,792,005	4,334,601
*Wisconsin Pub. Serv. and sub.	1,250,124	1,433,520
*San Diego Cons. G. & E.	1,239,286	1,441,116
*Oklahoma G. & E.	2,558,934	2,561,977
*Carolina Pwr. & Lt.	2,436,394	2,430,900

* Twelve months ended May 31.
† Twelve months ended April 30.

Oregon Areas Revive Public Power Plan

Efforts are being made to revive the proposal for public power districts in the Oregon area for the distribution of power from Bonneville Dam. Last spring the majority of the districts voted down the proposals and for a time it was believed that the issue was dead.

Recently Attorney-General Van Winkle of Oregon, when questioned concerning the interpretation of the utility district law, declared:

> There is no provision found in the statute for forming a people's district of the entire territory included within any proposed district, or of that portion thereof voting in favor of such formation after excluding those municipalities and separate parcels of territory which voted against such formation when the majority vote in the entire district is against the creation of such district.

It appears now that while the entire vote was against forming a public district, those areas favoring the formation are left free to hold another election for a new district. In this situation a different district would be voting to organize. However, the law provides that any separate unit automatically excludes itself when, in a district election, its majority vote is against the district.

The opinion, given the Oregon Hydro-electric Commission, was in connection with the proposed Northwest Oregon Bonneville People's Utility District, voted down last April 21 by a vote of 21,524 to 13,537. Some had contended the "yes" areas could be organized without another vote. Now it appears that those "yes" districts must again organize and vote on the question.

•

Plan Lighthouse Extensions

United States Lighthouse Service, Department of Commerce, Washington, D. C., has obtained a fund of $2,098,750 for extensions and improvements in lighthouse units located in 28 states. Work will include electrification of several stations, installation of new signal lights and operating facilities. Bids are scheduled to be asked soon.

•

Insull Claims to Be Met

Noteholders of the Corporation Securities Company of Chicago, bankrupt Insull investment company, have been notified that a payment of 4¾ per cent of the face value of their claims would be made after July 11 by Sam Howard, trustee. A total of $919,365 will be distributed under authorization recently given by Federal Judge James H. Wilkerson.

The funds were recovered by the trustee as a result of suits brought against New York and Chicago bank creditors of the company who held virtually all of its assets when it went into receivership in 1932.

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Graybar Gets Contract for Poles for Seminoe Dam Line

Secretary of the Interior Harold L. Ickes has announced award of contract for Western red cedar poles for the Seminoe Dam power line in the Kendrick project, Wyoming, to the Graybar Electric Company, on its bid of $105,873.

At the same time rejection of all tenders received for insulators and line hardware for this line was announced, because shortly after bids were opened prices on insulators dropped. The Bureau of Reclamation is now ready to issue advertisement for insulators on the Riverton project and also on the Colorado-Big Thompson project, in addition to the Seminoe line.

•

Demonstrate Applications of CO_2 Fire Extinguishers

Applications of "Lux" (carbon dioxide) portable and fixed fire extinguishing systems in putting out electrical and flammable liquid fires were demonstrated recently at the plant of Walter Kidde & Co., Bloomfield, N. J.

Included among the demonstrations was one which used running gasoline on a vertical surface, simulating a transformer fire. After burning for ten seconds, it was extinguished in eight, using a single cylinder wheel model. Direct discharge of the carbon dioxide "snow" on a running induction motor did not affect its operation by either stopping or flooding the motor. About 100 persons, including utility representatives, saw the demonstrations.

•

Canadian Utility Plans 30,000-Kva. Station

A new outdoor substation, semi-automatic in operation, is being constructed by Montreal Light, Heat & Power Consolidated. The station will be completed in the fall and when placed in service will form another link in the chain of substations operated by the company at strategic locations throughout the metropolitan area. It will have an installed capacity of 30,000 kva.

The new station incorporates the latest engineering developments and will occupy an over-all area of more than 40,000 sq.ft. Overhead distribution wires in the immediate vicinity of the substation wil be replaced with underground cables and the ground landscaped.

Power will be supplied by four underground cables at 12,000 volts from the Shawinigan terminal station on Orleans Street. Two 14,000-kva. transformer banks will be installed to feed the distribution bus, each bank being supplied by two underground cables. The nineteen distribution feeders will be equipped for service with one feeder held in reserve. Each feeder has an oil circuit breaker equipped with reclosing apparatus that automatically disconnects the power supply in the event of trouble.

Distribution feeders will leave the substation at 4,000 volts and local street transformers will reduce voltage to customers' requirements. Station illumination will be regulated by means of a photo-electric cell.

FIRE FIGHTING—A carbon dioxide automatic flooding system extinguished this building fire in seven seconds at a recent demonstration by Walter Kidde & Co.

A. G. Christie Named as A.S.M.E. President

Alexander G. Christie, professor of mechanical engineering, Johns Hopkins University, was nominated for president of the American Society of Mechanical Engineers at the recent semi-annual meeting at St. Louis, Mo.

Nominees for other offices are: Vice-presidents, Henry H. Snelling, Snelling & Hendricks; W. Lyle Dudley, Western Blower Company; James W. Parker, Detroit Edison Company, and Alfred Iddles, Babcock & Wilcox Company; managers, Clarke Freeman, Manufacturers Mutual Fire Insurance Company; Willis R. Woolrich, dean of engineering, University of Texas, and William H. Winterrowd, Franklin Railway Supply Company.

While these nominees must be elected by letter ballot of the entire membership, election has followed nomination in the past.

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Appoint Nine New Members to Power Show Committee

Nine new members have been appointed to the advisory committee of the thirteenth National Exposition of Power and Mechanical Engineering, to be held at Grand Central Palace, New York, December 5-10. New members of the committee are:

Comfort A. Adams, E. G. Budd Manufacturing Company; J. T. Barron, Public Service Electric & Gas Company; R. E. Dillon, Boston Edison Company; Crosby Field, American Society of Refrigerating Engineers; A. C. Fieldner, United States Bureau of Mines; N. E. Funk, Philadelphia Electric Company; George L. Knight, Brooklyn Edison, Inc.; Joseph Pope, Stone & Webster Engineering Corporation; Alfred Vaksdal, Corning Glass Works.

•

Northern States Dividend Cuts Explained by Pack

R. F. Pack, president of the Northern States Power Company of Delaware, in a letter sent to holders of preferred stock of the company, explained that the recent action of the directors in reducing the dividends on the 6 per cent and 7 per cent preferred stocks was due to the reduction in the net earnings of the Northern States Power Company of Minnesota, a subsidiary, from which Northern States of Delaware derives the largest part of its revenue. Dividends for the quarter ending June 30 on the two classes of preferred stock were reduced to $1.12½ and $1.31¼ on the 6 per cent and 7 per cent issues respectively, compared with regular payments of $1.50 and $1.75.

Mr. Pack said that increased operating expenses wholly beyond control of the Northern States Power Company of Minnesota, coupled with drastic rate reductions which have been made in the last several years, were the compelling factors for the lowering of the dividend rates.

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Agent for Plastic Presses

F. J. Stokes Machine Company, Philadelphia, has been appointed sole sales agent for the complete line of "Standard" plastic molding presses, manufactured by Standard Machinery Company, Mystic, Conn.

Meetings

American Institute of Electrical Engineers Pacific Coast Convention, Portland, Ore., August 9–12. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

World Power Conference—Vienna sectional meeting, August 25–September 2. Executive committee, U. S. National Committee, World Power Conference, 4 Irving Place, New York, N. Y.

Rocky Mountain Electrical League—Annual meeting, Canyon Hotel and Lodge, Yellowstone Park, Wyo., August 29–31. George Lewis, managing director, Gas and Electric Building, Denver, Colo.

Illuminating Engineering Society—Annual convention, Nicollet Hotel, Minneapolis, Minn., August 29–September 1. A. D. Cameron, general secretary, 51 Madison Avenue, New York, N. Y.

International Association of Electrical Inspectors—Eastern section, Hotel Lord Baltimore, Baltimore, Md., September 6–8, F. N. M. Squires, secretary, 85 John St., New York, N. Y. Southern section, George Washington Hotel, Jacksonville, Fla., September 12–14, Joseph Whitner, secretary, P. O. Box 1743, Atlanta, Ga. Western section, Hollenden Hotel, Cleveland, Ohio, September 19–21, F. H. Moore, secretary, 320 N. Meridian St., Indianapolis, Ind. Northwestern section, Hotel Spokane, Spokane, Wash., October 3–5, F. D. Weber, secretary, P. O. Box 70, Portland, Ore. Southwestern section, Hotel Lafayette, Long Beach, Calif., October 10–12, H. L. Gerber, secretary, 205 City Hall, San Francisco, Calif.

Empire State Gas & Electric Association—Annual convention, Lake Placid Club, Lake Placid, New York, September 15-16. George H. Smith, secretary, Grand Central Terminal, New York, N. Y.

Wisconsin Utilities Association—Transportation section, Lawsonia, Green Lake, Wis., September 19–20; accounting section Lawsonia, September 23–24. A. F. Herwig, executive secretary, Brumder Bldg., Milwaukee, Wis.

Indiana Electric Association—Annual convention, French Lick, Ind., September 29–October 1. Tom C. Polk, secretary, 607 Traction Terminal Bldg., Indianapolis, Ind.

American Transit Association — Annual meeting, Toronto, Canada, October 2–7, Charles Gordon, managing director, 292 Madison Avenue, New York, N. Y.

National Safety Congress—Silver Jubilee, Stevens Hotel, Chicago, Ill., October 10–14.

Standard Gas Places New Units in Service

During the past six months the public utility companies in the Standard Gas & Electric system have placed in operation four new generating capacity installations, according to Bernard W. Lynch, president. Five additional are in process of construction.

Upon completion of this program, Mr. Lynch said, the combined properties of the system will have put in service, within a period of approximately one year, 183,250 kw. of additional generating capacity, which is with possibly one exception, the largest amount ever installed on the system in a comparable period and represents about 12 per cent of the total generating capacity at the beginning of the period.

While electric output for the system has reflected general business conditions, it is believed that a pickup in business in the fall will make for greater use of electricity. The drop in net operating revenue and other income of the system is attributed principally to the companies operating in the highly industrial regions. Any stimulation to general business would aid the system.

•

Uniform Accounts Ordered for Smaller Utilities

Uniform systems of accounting, effective January 1, have been prescribed by the New York Public Service Commission for smaller utility corporations operating within the state. Similar uniformity has been required of the larger companies. The latest order applies, the commission said, to gas and electric corporations with annual operating revenues of between $15,000 and $250,000; water works companies with revenues of between $15,000 and $100,000 and telephone corporations with revenues of between $15,000 and $50,000. The new accounting systems are "a simplification" of those laid down for the larger corporations and "provide for different treatment of minor items."

•

Glass Companies to Exhibit

Exhibits of the Corning Glass Works, Owens-Illinois Glass Company and Pittsburgh Plate Glass Company at the New York World's Fair will be housed in a million-dollar "Glass Center," R. L. Hamill, president of Glass, Inc., said last week. Built primarily of glass, the exhibit will occupy about 25,000 sq.ft., and will include a 108-ft. tower.

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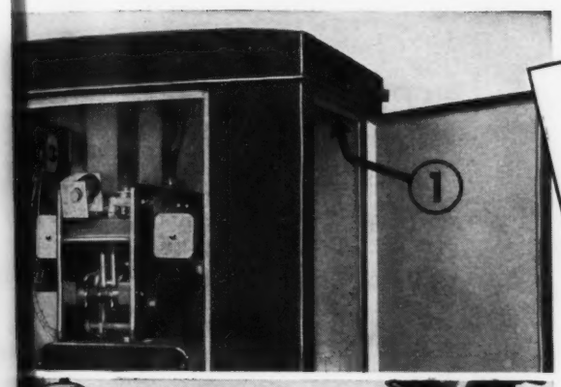
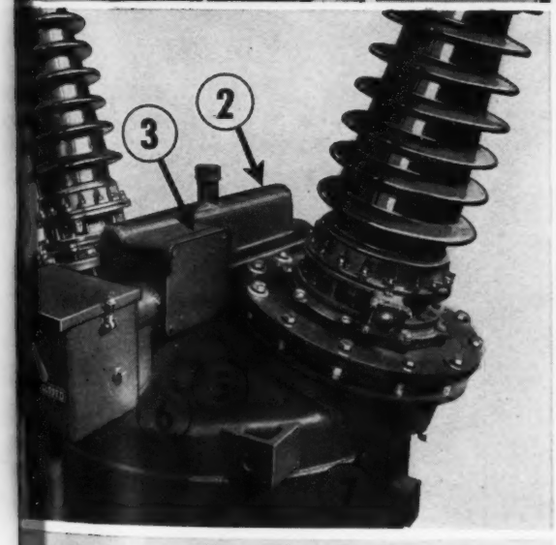
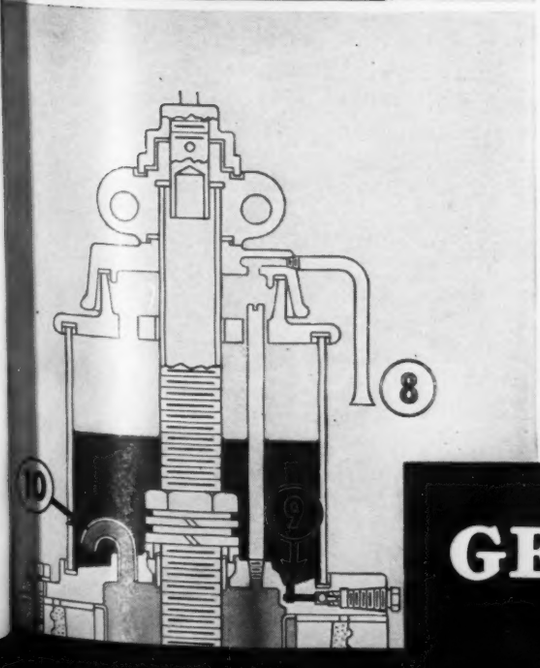






1. Wide eaves and deep door flanges on the operating-mechanism housing.
2. Mechanism box welded to the dome.
3. Metal bulkhead inside separates mechanism box from interior of breaker dome—crank passes through bronze bushing to transmit motion to moving parts.
4. Triple protection where mechanism enters breaker—an inner seal, a gasket, an overhanging cover.
5. Plenty of bolts for a good gasketed joint.
6. Dome welded to the tank.
7. Bushing supports raise the gaskets above the surface of the dome.
8. Breather tube with bell mouth to keep water from siphoning into the expansion chamber of the oil-filled bushing.
9. Sump to trap condensed moisture and to permit draining it.
10. Thermal seal prevents oil in the expansion chamber from mixing with the oil in the bushing.

You know the importance of keeping breaker insulating oil free from moisture. You have seen here ten of the many precautions built into G-E outdoor breakers—evidence that G-E oil-circuit-breaker designers recognize the extreme importance of mechanical perfection. Ask our representatives to explain in more detail the value of each of these features. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

800-69

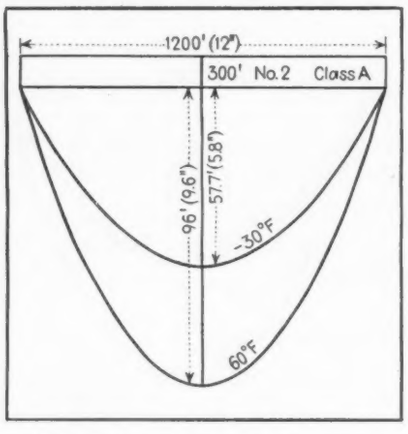
Field OPERATING PRACTICES

New ideas and practices in the operation of well-designed, constructed and maintained plants and systems

How to Make a Sag Templet

By BERTRAM E. ELLSWORTH
Electrical Engineer Iowa-Nebraska Light & Power Company, Lincoln, Neb.

Probably the usefulness of sag templets as tools in the design of transmission lines is better known than is the method of making them. Two curves are ordinarily used, both on one templet. One is the final sag curve at 60 deg. F. and the other is the "cold curve at —20 deg. F. or —30 deg. F. The former is used to secure proper ground and structure clearances and the latter to check uplift resulting from conductor contraction.



Calculation of sag templet curves

Span Length, Ft.	Span Length, %	Center Sag, %	Sag for 60° Curve, Ft.	Sag for —30° Curve, Ft.
0	0	0	0	0
120	10	37	35.5	21.3
240	20	64	61.4	36.9
360	30	84	80.6	48.4
480	40	96	92.1	55.4
600	50	100	96.0	57.7

Any vertical or horizontal scale may be used in drawing profiles of lines, a convenient one for vertical dimensions being one inch equal to ten feet and for horizontal one inch equal to one hundred feet. These scales are used in making the illustrated templet. The standard length of curve used by the writer is four times the length of the maximum span. The following example explains in detail the construction of a templet for a Class A line, using No. 2 stranded H.D. copper wire for the heavy loading district with a 300-ft. maximum span. The templet will be equivalent to 1,200 ft. long:

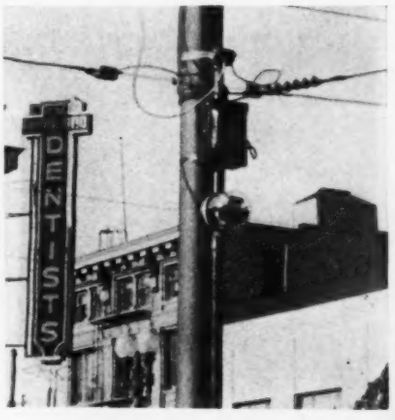
Consider first the clearance or 60 deg. F. curve. From the National Electrical Safety Code, the sag for No. 2 wire for a 300-ft. span is 6 ft. From the parabola formula the equivalent tension is found to be 383 lb. In order to make a 1,200-ft. templet the tension at this new length is assumed to be the same as for a 300-ft. span. This assumption has been proved to be correct, at least for all practical purposes.

Using the above tension with a 1,200-ft. span, with the formula of the parabola the maximum sag at 60 deg. F. is found to be 96 ft. Referring to the table which is a part of the accompanying illustration, this 96-ft. sag is shown as 600 ft. from one support which is 50 per cent of the span length and 100 per cent of center sag. At points 120, 240 ft., etc., from the support the sags are given and are used in plotting the templet curve. The values listed in the column "Per Cent of Center Sag" are constant for a parabola and are used for calculating the sags at the different percentages of span length.

In like manner, the "cold" or uplift curve can be constructed at any desired temperature. Martin's tables or the scheme of plotting sag against temperature may have to be resorted to in order to arrive at a sag value at this low temperature. The curves shown were plotted from the table using the scales referred to above. Heavy celluloid has been found very convenient for the actual templet.

Permanent Service to Decorative Lights

To avoid the necessity for throwing up makeshift wiring every time decorative street lighting is desired, the city of Oakland, Calif., its downtown merchants and the Pacific Gas & Electric Company have evolved a permanent installation for this purpose.



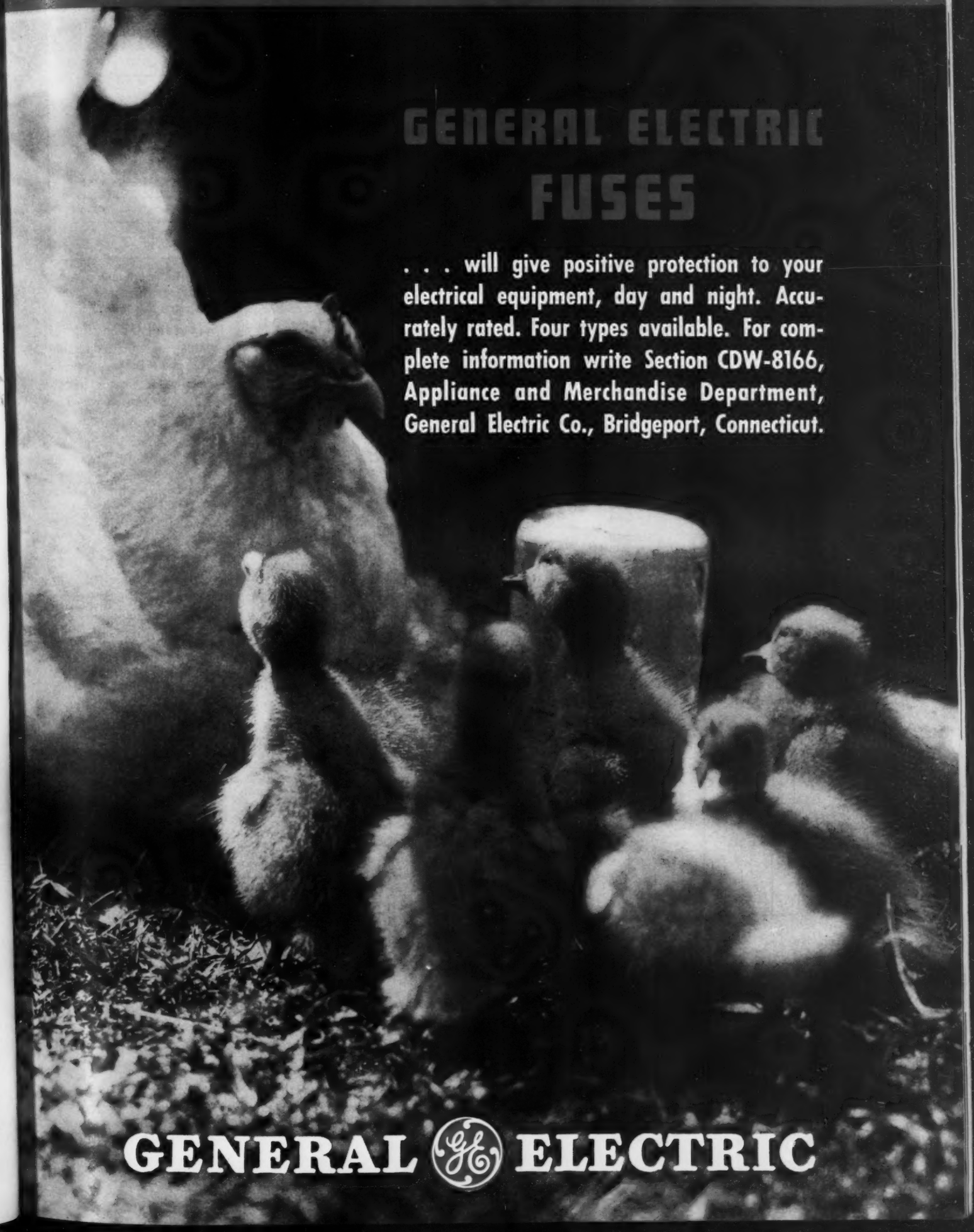
Permanent installation serves decorative street lighting

Permanent service heads have been located on steel poles of the street railways. Placed on each side of every block, these heads are served through 1½-in conduit, carried up the pole from an adjacent manhole. Three No. 6 wires provide 11½-kw. circuit capacity on each side of a block. A socket meter and 60-amp., 230-volt, rain-proof externally operated switch are employed.

Ownership of the equipment is retained by the utility and energy is billed to merchants along the block in which the lighting is used.

Being permanent and rigid, the in-

PROTECTION



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GENERAL ELECTRIC

stallation is neat in appearance, provides a continuously available source of energy and is not subject to injury from accidents caused by passing traffic, as a temporary connection so often is.

•

Design Low-Cost Transformer Rack

A transformer rack that lends itself to the low cost requirements of small industrial and commercial installations has been designed by engineers of the Danbury & Bethel Gas & Electric Light Company. It is estimated that the type of construction used in Danbury costs about one-half as much as a comparable inclosed substation on the ground and about two-thirds as much as the usual platform structure of similar size.

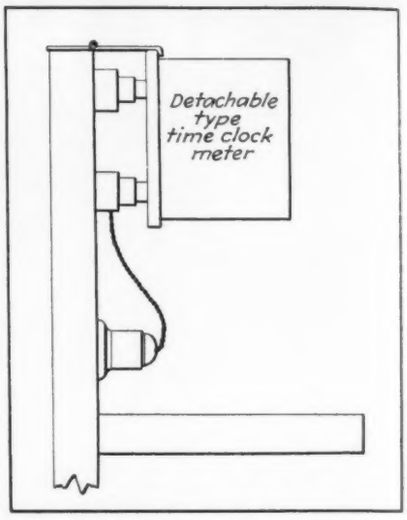
The design, which is illustrated herewith, uses a rack to support one 100-kva. lighting transformer and a bank of three 50-kva. power transformers. The smallest possible ground space that would have been considered for an installation of this type was 8x20 ft. The design was first used to serve the McCrory store in Danbury, where the right-of-way could not be obtained for a ground type substation in a much-used areaway behind the store. The area that would have been occupied by such a bank is now used by parked automobiles.

In the above-mentioned installation both the lighting transformer and the power transformers are supplied from the same 2,300-volt primary circuit. Separate secondary buses are provided for lighting and power to minimize flicker resulting from operations on the power circuit.

•

Door Hinge Holds Meters for Testing

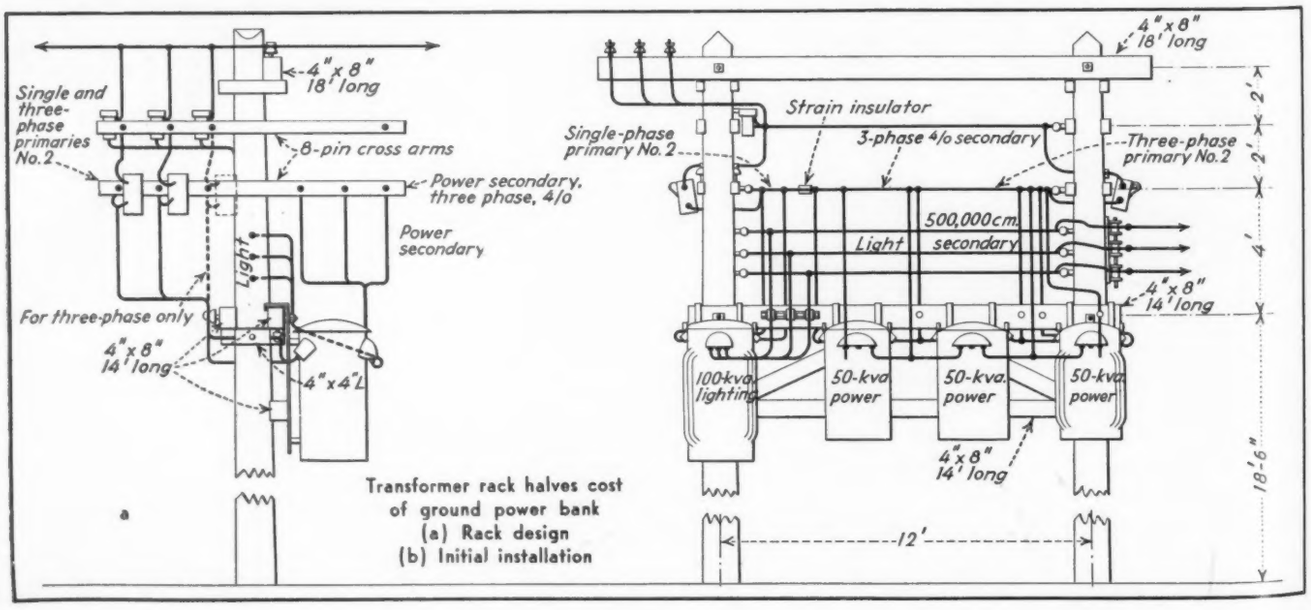
When permanently installed, detachable type meters are secured in place by holding rings that clamp over flanges on the meters and bases. But to put on and take off a holding ring for every meter that is set up for inspection or test in the laboratory is quite a waste of time because the job can be done much more simply and quickly. In the meter department of the Milwaukee Electric Railway & Light Company a special board has been constructed



Hinges save time in detachable meter testing

for gang testing and inspecting of time clock meters of the detachable type which are used in large numbers on electric water heater installations served by the company. The meters are set up on and removed from this board with no more trouble than to stick them up and take them down.

The board has positions for a dozen or more meters, each position as illustrated in the accompanying sketch. The base inclosures are not used on the board, only the four jaw type terminals. Only two of the terminals are energized, those through which current is supplied to the clock motor. This connection is made with the twisted cord and receptacle as shown so that any clock may be de-energized without affecting the others. But the novel thing



Transformer rack halves cost of ground power bank
(a) Rack design
(b) Initial installation

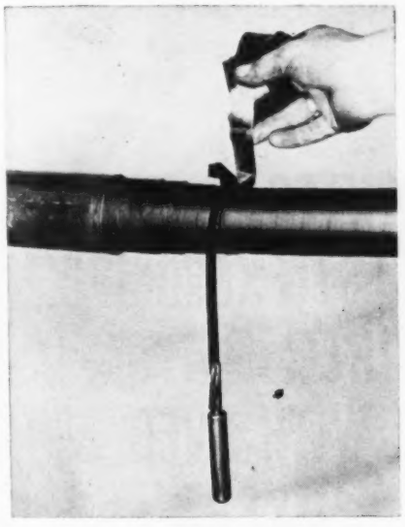
about this board, the device that saves so much time in setting up and taking down the meters, is the use of a common, barn-door hinge with a bent-over end on one leaf that is flopped down over the flange on the meter case and holds it securely in position.

•

Insulation Stepper for Cable Splicing

By DAVID ANDERSON
Construction Department,
Commonwealth Edison Company, Chicago

For stepping paper tape insulation in making splices on single-conductor high-voltage cable the tool illustrated



Easy to apply and use this insulation stepper

is handy and easy to use. The device consists of a spring steel band—a piece of steel tape line—about $\frac{3}{8}$ in. wide and 20 in. long. One end of the band is fastened in a slot in a small brass block. In the other end is a $\frac{1}{4}$-in. hole in which a removable weight may be hung.

To apply the band ready for the stepping operation the weight is removed and the band is wrapped twice around the insulation, the free end of the band being threaded through the slot in the brass block on each turn. The weight is then attached and the band is pulled taut at the place where the first insulation step is to be made. When the first step is completed the band is loosened, moved to the next position and tightened again, the band remaining wound around the cable until all of the steps have been made.

Maintenance of Throw-Over Switches

By LUDRIK J. JEHLICKA
Commonwealth Edison Company, Chicago

Three kinds of throw-over switches, manual, remote control and automatic, are used by the Commonwealth Edison Company on four-wire, 4-kv. services for transfer from the regular to a second supply line when emergency requires. These switches are installed on overhead and in vault services, and because of the duty on them must be frequently inspected and well maintained. From experience it has been found that certain mechanical and electrical parts are subject to greater wear than others, as, for instance, the tripping latch, or cam, which is watched closely and repairs and adjustments are made to forestall failure.

Relays are tested annually for pick-up and drop-out voltage settings. Adjustments are made in spring tensions and air-gap settings to obtain the desired pickup and drop-out voltage values. All porcelain bushings of 400-amp. switches on overhead platforms are subjected to a high-voltage test annually to find defective bushings in order to eliminate ultimate failures of the switch. Porcelain bushings of switches in vaults are tested every two years. Bakelite inserts of the disconnect bars are measured for insulation resistance every two years. The disconnect bar is the conducting path over which the feed from the incoming cables is directed to the switch and to the load. Tests are made every three years on oil from the switch tanks and potential transformer case to ascertain dielectric strength, sludge and sulphur content.

During inspections potential defects found are corrected, as well as operating troubles. Thus the inspections often locate and remedy troubles before costly failures occur. The field work is done by a troubleman and a lineman under the supervision of an engineer. An inspection program based on five years of field experience has been adopted for this work and is in use. The plan provides for inspections arranged in a staggered manner throughout the year in order to divide the time between them as evenly as possible.

• • •

*Secondary Distribution Economics**

II—Voltage Drop and Transformer Size

By E. M. ADKINS
Jersey Central Power & Light Company,
Asbury Park, N. J.

Equations for voltage drop, circuit length and transformer size of a circuit having a four-way feed, as shown, are developed in the same way as for a straight two-way feed.

Four-way feed

$$V = \frac{T^2\,Dz}{16{,}000} \text{ volts}, \quad T = \sqrt{\frac{16{,}000\ v.}{Dz}} \text{ feet},$$

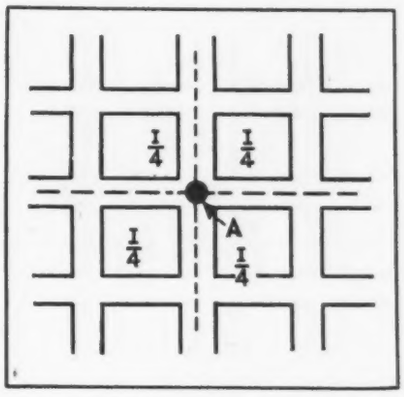
$$I = 4\sqrt{\frac{DV}{1{,}000\ z}} \text{ amps.}$$

$$\text{Transformer kva.} = \frac{EI}{1{,}500} = \frac{4E}{1{,}500}\sqrt{\frac{DV}{1{,}000z}}$$

for single phase banks and

$$\text{Transformer kva.} = \frac{\sqrt{3}\,EI}{1{,}500} = \frac{4\sqrt{3}\,E}{1{,}500} \times \sqrt{\frac{DV}{1{,}000z}} = \frac{4E}{1{,}500}\sqrt{\frac{3DV}{1{,}000z}}$$

for Three-phase banks.



Current distribution in four-way secondary

By comparison, it is seen that these equations are twice the corresponding values for a straight two-way feed. Curves given in ELECTRICAL WORLD of June 18, page 75, can be used to determine length of circuit and transformer capacity by doubling the values read from these curves.

* Installment No. 7 in a sedries to continue in forthcoming issues.

A SMASHING NEW SALES PLAN!

"Free

PRESENTED BY STANDARD, THE OLDEST EXCLUSIVE MANUFACTURER OF ELECTRIC RANGES, WITH OVER 200,000 USERS

EVERY WOMAN WILL WANT TO KNOW ABOUT *"Free Cooking"*

A proven feature which Standard will emphasize in its advertising and selling.

DEALERS EVERYWHERE WILL CASH IN ON OUR *"Free Cooking"* SALES PLAN

A Standard feature with sensational sales possibilities. When explained to your community, it will create a buying wave never before known in electric range selling.

ELECTRIC UTILITIES WILL WELCOME *"Free Cooking"*

A new plan that will banish the bugaboo that remains in the minds of some women that electric cooking is costly. An opportunity to render a real public service by bringing to women everywhere the convenience, cleanliness and economy of electric cooking.

Cooking!"

STANDARD PROPOSES TO POINT OUT THE REAL ECONOMY OF ELECTRIC COOKING UNDER THE SENSATIONAL SLOGAN "*Free Cooking*"

AN ADVANCED PLAN BACKED BY SOUND SELLING FEATURES

1. ***A line that has always pioneered and is now further improved and refined...*** **composed of *six* Standard models designed to serve 98% of the range market which puts Standard ahead in future sales opportunities.**

2. ***A sales organization enlarged to handle increasing sales volume...*** **merchandising plans extended to support that progress.**

3. ***The oldest exclusive electric range manufacturer*** **offers new advertising and selling ideas, with greater service to distributors, dealers and electric utilities—all with one end in view—to extend electric range service to more homes—to build revenues for the utility—and to produce greater sales and profits for the distributor, dealer and manufacturer.**

AN ELECTRIC RANGE WHICH HAS STOOD THE TEST OF TIME

Over 200,000 users of Standard electric ranges **pay tribute to perfect performance through 25 years of service. The goodwill of these customers, successfully served, will lead the way to future sales.**

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"*Free Cooking*"...A MESSAGE THAT WILL APPEAL TO MILLIONS

Told through consumer advertising, broadcast in direct mail literature, discussed in cooking schools and repeated by thousands of salesmen selling Standard ranges, this message will multiply consumer interest in Standard electric ranges. Backing that public interest is a line of ranges engineered to highest approved standards. Beautifully designed to meet modern consumer requirements with *eye appeal* unexcelled by others, every Standard model is equipped with the approved Chromalox surface heating unit. There is a Standard model, competitively priced, to meet every home cooking need. To reach the hotel and restaurant market, Standard manufactures a full line of commercial units.

With an augmented executive and sales personnel and increased manufacturing facilities, Standard welcomes the opportunity to serve the energetic and *live* distributor and dealer.

SEND COUPON

FOR FULL PARTICULARS ON THE HOTTEST RANGE SELLING PLAN EVER OFFERED!

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Please advise details of your distributor-dealer Free Cooking plan.

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Industrial ELECTRIFICATION

New ideas and practices in industrial electrification as presented by industrial, consulting and power sales engineers

Bus Distribution Promotes Flexibility

By G. A. HESS
Public Service Electric & Gas Company, Trenton, N. J.

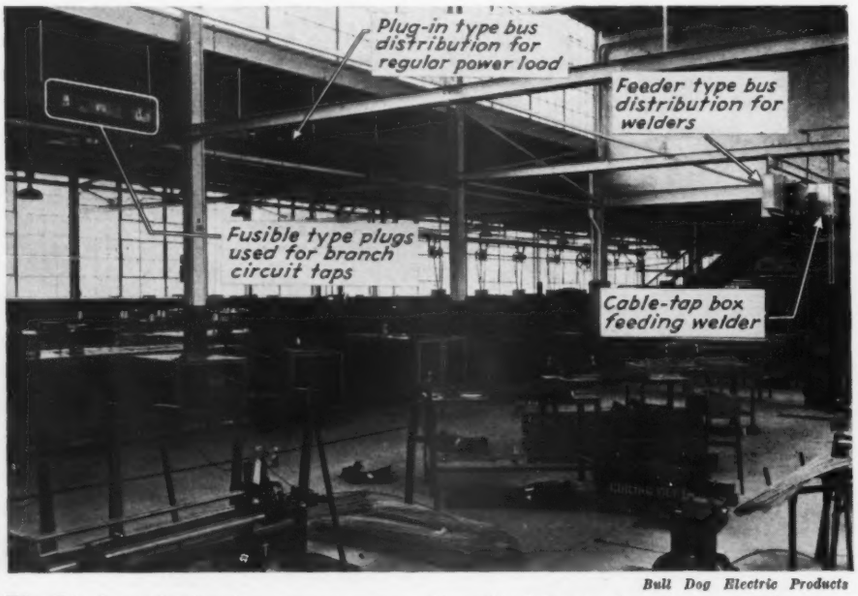
Flexibility, permitting convenient rearrangement of production machines to meet the requirements of modern straight-line production, has been achieved in the electrical distribution system of the new Trenton, N. J., plant of the L. A. Young Spring & Wire Corporation by the use of prefabricated "Bustribution" type wiring. Negligible voltage drop and flickerless lighting with ample capacity for future expansion are correlated advantages of the installation in the plant, whose principal loads are welding, general power and lighting. Separate transformer banks are used for each type load.

The welding load, composed of one 250-kva., four 75-kva. and two 18-kva. units, is supplied from an open delta bank of two 200-kva. transformers. Energy is distributed to the welders through 1,500 amp. Bustribution, composed of four ¼x3-in. copper bars per phase. The substation is located on a mezzanine floor immediately above the welding department. Feed to the distribution system taps in at about a central point, and the system runs both ways to taps for the various welders. Since the system can be tapped at any point it is a matter of but a few minutes work to relocate welders.

Regular power load in the plant is about 400 hp., scattered throughout the remainder of the building. Energy is distributed through four 250-ft. runs of 375-amp. Bustribution. These runs parallel the sides of the building and form a rough H. Two 200-kva. transformers in open delta serve this load and are located on a mezzanine near the center of the H.

Lighting load is approximately 200 kw., principally high-intensity mercury-vapor units. Lighting distribution is a separate four-wire, three-phase system. No flicker is observable in the lighting, nor has any voltage drop developed to cause difficulty with the mercury lamps.

This installation of prefabricated industrial wiring is the first in the Trenton area and the general satisfaction with its operation has led several other plants in this region to use the system in plant modernization and extension.


Plug-in type bus distribution for regular power load
Feeder type bus distribution for welders
Fusible type plugs used for branch circuit taps
Cable-tap box feeding welder

Bull Dog Electric Products

Flexible bus distribution system serves diversified load of spring manufacturer

•

Devise Paraffin Vat for Dipping Cheeses

A recent application of electricity to the dairy industry is an electrically heated paraffin vat for dipping cheese "wheels" devised by the Washington Water Power Company, Spokane. In a dairy products plant the cheese wheels are received in a "raw" or fresh state and then coated by dipping in hot paraffin. This coating prevents the formation of mold so that the cheeses may be kept for long periods without spoiling.

As indicated in the accompanying sketch, the electrically heated vat consists of a 21 x 32 x 25-in. double-walled sheet iron tank in the sides and bottom of which heating units are installed in three inches of mineral wool. A total capacity of 7.5 kw. is used, divided as follows: 1.5 kw. on each of the two long sides and 4.5 kw. in the bottom. Three heat switches are used for manual control of the temperature. The full capacity is used to bring the paraffin

As Simple as Driving a Nail—

When driving

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non-rusting GROUND RODS

The only tool you need is a hammer

NO special driving tools are needed with Copperweld Ground Rods. Your men can easily drive even the smaller sizes—such as half-inch by eight foot—without the rods bending. The rigid core of special steel takes care of that.

Labor costs are lower with Copperweld Rods, and losses from scrapping bent or deformed rods are practically nil.

Because the top ends of all Copperweld rods are chamfered to reduce "mushrooming" during driving, the clamps may be slipped over the tops of the rods *after driving*.

And Copperweld Type B Clamps provide the simplest, most dependable and economical means of connecting the grounding wire to the rod.

Have you received your copy of the new Copperweld Ground Rod and Clamp Data Book? If not, just ask for it on your company letterhead. Specify Copperweld Ground Rods and Clamps for economy and dependability.

COPPERWELD STEEL COMPANY

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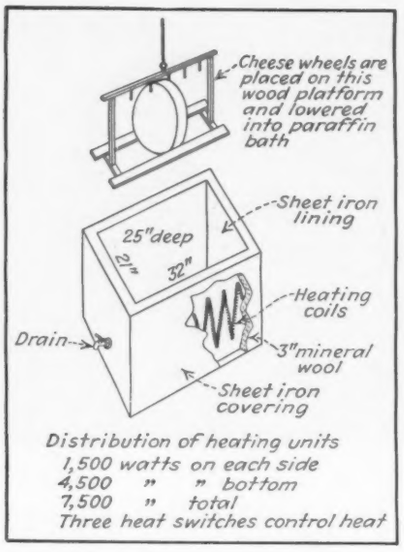


Electrically heated paraffin vat devised for dipping cheese "wheels" in a dairy products plant

up to proper temperature, which is then maintained by switching to medium or low heat. Operation would be improved, the company heating engineers state, by the use of a thermostat.

•

New Kiln Technique ReducesConsumption

A 57 per cent reduction in the per unit electrical energy consumption for burning common brick has been realized by the Alva S. Staples Brick Manufacturing Company, Malden, N. Y., by a change from medium to low-pressure burning.* A 25-hp. motor-driven centrifugal blower formerly supplying air at 3 lb. pressure to oil burning nozzles in Scove type kilns consumed about 3 kw.-hr. per 1,000 brick. At present, with a 10-hp. motor supplying air to the nozzles at 1 lb. pressure, only about 1.3 kw.-hr. is required per 1,000 brick burned. Length of an average burn in this company's yard is 120 hours for a 1,000,000-brick kiln.

Low-pressure burning is a comparatively new practice in brick yards. In recent years pressures as high as 30 lb. per square inch have been employed in the belief that the fuel oil used was better atomized at the nozzles by the action of the high air pressure. Lower burning pressure has been the logical development of experience showing that a large quantity of low-pressure air gives satisfactory atomizing action.

Experience at the Staples yard and at others which followed the trend to lower pressures indicates that with high pressures (35 lb. per square inch) the electrical energy consumption for burning represented about 45 per cent of the total energy consumption of brick manufacture. At this pressure the consumption for burning was a little greater than 7 kw.-hr. per 1,000 brick. Low-pressure burning has cut the electrical energy consumption for this operation to the point where it now represents but 14 per cent of the total electrical cost of brick making. The Staples yard is in the Kingston, N. Y.. territory of the Central Hudson Gas & Electric Corporation.

* Low and medium pressure burning is a trade phrase that refers to the pressure of the combustion air delivered to burner nozzles for mixture with fuel oil burned in the brick kilns.

•

MountTurbinePumps to Withstand Flood

In parts of southern California, where deep-well turbine pumping equipment must be installed in or close to riverbeds or other localities of high water, it has long been the practice of owners to remove equipment before rainy seasons in order to avoid possible total loss of equipment through sudden floods. Even then the wells were sometimes ruined by the floods, and, moreover, moving the equipment represented a considerable annual expense.

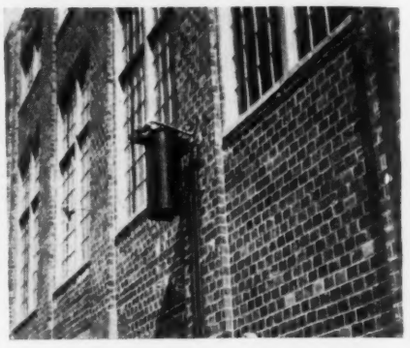
To eliminate this annual expense pumps have been designed with the motor supported on a column pipe extension well above floodwater height. This whole assembly rests on a concrete base which extends below the riverbed.

Illustrated is an installation by Peerless Pump Division of Food Machinery Corporation, Los Angeles, at Monte Vista Ranch, El Canjon, Calif. The pictures show the unit before and after a recent abnormally heavy rain. The unit remained intact, after the resulting torrent had torn out everything else in its path, including trees and power poles, and had lowered the surrounding land level by 3 ft. It is reported that no failures of Peerless flood-proof units occurred during the widespread floods in southern California this year.

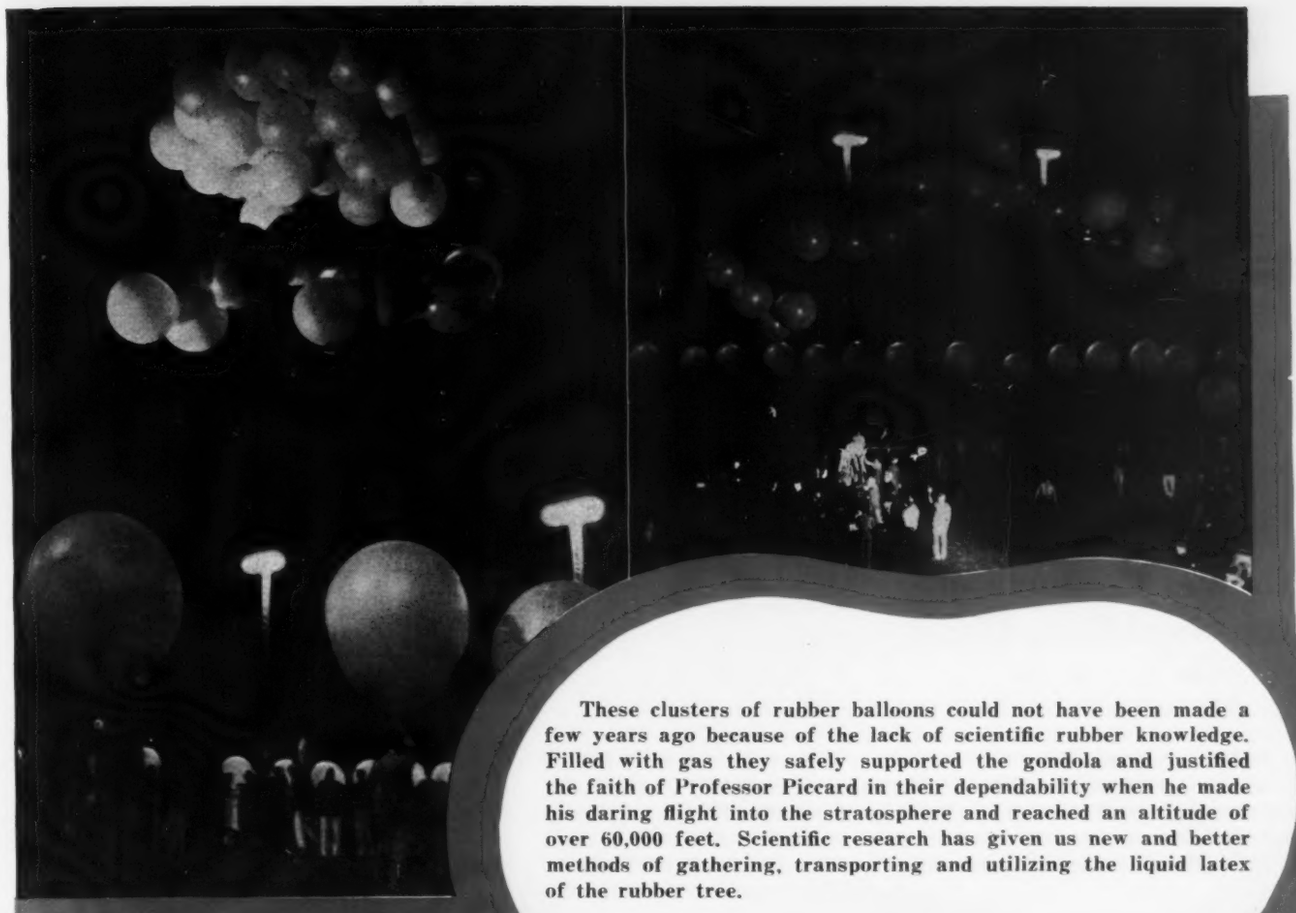
Mount deep-well pump motor on special column to avoid annual damage from floodwaters

(a) Arrangement of pump drive before flood. (b) Pump installation survives even the power line that served it after flood recedes.

MOUNT TRANSFORMER ON WALL



To keep secondary service at minimum length and avoid unnecessary expense the Puget Sound Pulp & Timber Company resorted to this method of mounting a transformer. It is suspended from a bracket on the side of the building, about 25 ft. above ground. The 2,400-volt primary is underground from the company's own substation and is carried up the building wall in conduit. The secondary is carried down the wall and through to the distribution center, in conduit. Secondary is 120-240 volt and transformer capacity is 50 kva.



These clusters of rubber balloons could not have been made a few years ago because of the lack of scientific rubber knowledge. Filled with gas they safely supported the gondola and justified the faith of Professor Piccard in their dependability when he made his daring flight into the stratosphere and reached an altitude of over 60,000 feet. Scientific research has given us new and better methods of gathering, transporting and utilizing the liquid latex of the rubber tree.

Simplex-LATOX Insulation for wire and cable is a product of SCIENTIFIC RESEARCH too . . .

Simplex-LATOX rubber insulation for wires and cables is made directly from prevulcanized rubber latex and is deposited on the conductor in a series of films to form a thin, homogeneous wall of high-grade rubber insulation containing not less than 93% rubber and having uniform physical and electrical characteristics.

Simplex-LATOX rubber insulation is waterproof, permanent and retains indefinitely the qualities of a high-grade rubber insulation. It makes possible small diameter, light-weight, moisture-proof cable for supervisory control of utility sub-stations, police and fire alarm, telephone and signal service and electric or steam railroad control or signal systems.

With Simplex-LATOX insulation smaller conduits can be specified for new installations than would otherwise be possible. The capacity of old conduit systems is increased because more conductors can be installed in a given area. Investment in larger conduits can be eliminated or postponed.

A new LATOX booklet is ready now for distribution. We will gladly send you one upon request.

Simplex Wire & Cable Co., 79 Sidney St., Cambridge, Mass.

Simplex – LATOX

Thin insulation made directly from rubber latex

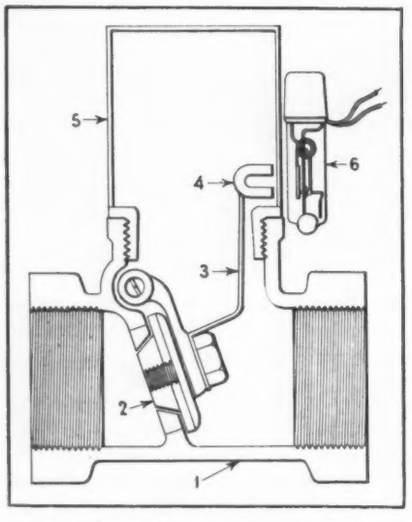
New ENGINEERING IDEAS

Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory

No Wet Contacts in Improved Flow Alarm

By H. A. ADLER
Equipment and Research Section, Commonwealth Edison Company, Chicago

In some water-cooled transformer and other equipment installations economy requires that water flow be kept quite small, say of the order of a half gallon per minute. Therefore a rather sensitive alarm device, adjustable to operate at low rate of flow, is needed to signal unexpected stoppage of flow. Frequently such devices include electrical contacts either actually in water or in wet spaces, and corrosion becomes a source of trouble. An alarm contactor which is simple in design and contains no wet contacts is shown in the accompanying illustration.



Simple water flow alarm device has no wet contacts

The device consists essentially of a swing-type check valve of standard construction (1) and a magnetic switch (6). The check valve is adapted to give proper movement at small flows by means of a special insert with conical seat (2). A small magnet (4) is attached to the moving vane of the check valve by means of a rigid support (3). The standard cap of the check valve has been replaced by a special brass inclosure (5) which allows sufficient space for the movement of the magnet.

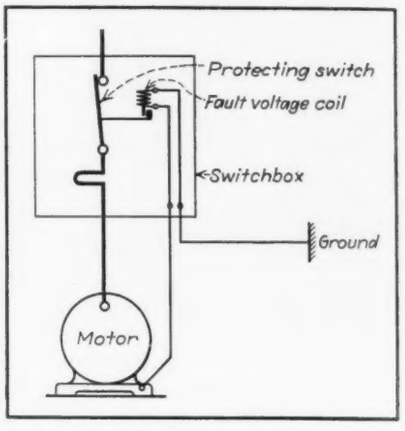
Water flowing through the check valve pushes the special insert off its seat and holds the magnet away from the switch. Under this condition the switch is open. As the rate of flow decreases the magnet approaches the switch, causing it to close an alarm circuit when the flow of water has fallen below the desired minimum value. The position of the magnet with relation to the switch can be adjusted to vary the rate of flow at which the switch operates.

•

Fault-Voltage Device Protects Workmen

Elimination of a fruitful source of industrial electrical accidents is the aim of a simple fault-voltage tripping device that is being used in Europe to cut off the supply voltage from electrical machines as soon as a fault voltage appears on any metal part accessible to touch.

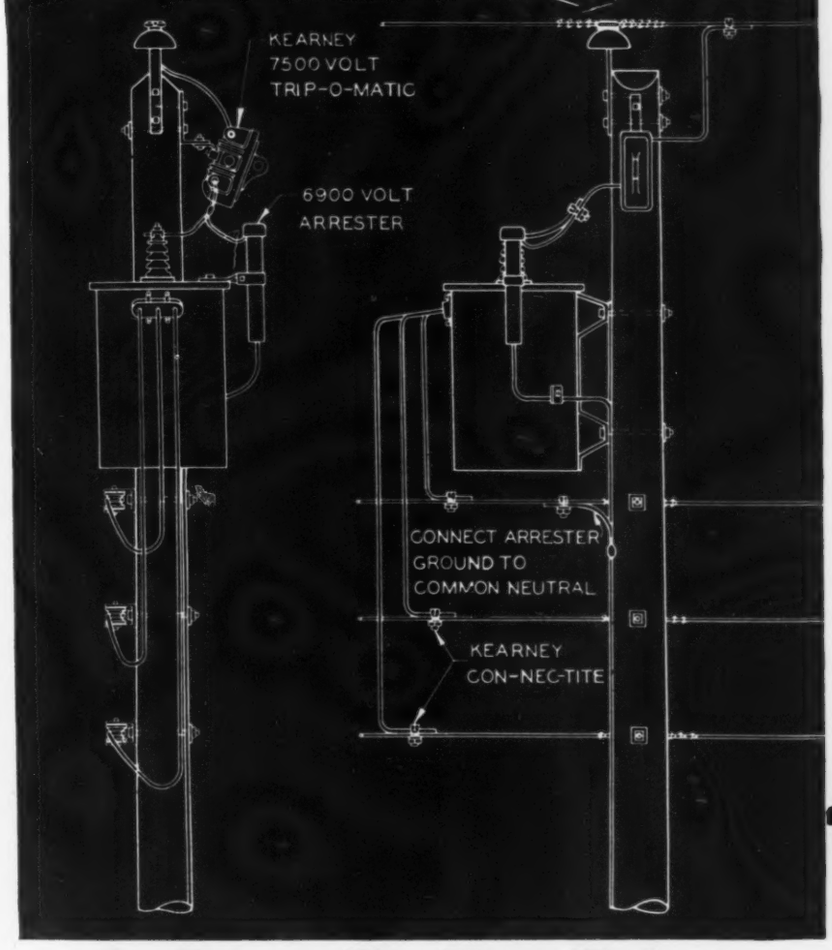
The apparatus disconnect switch carries the fault-voltage tripping device, which is a small relay the coil of which is connected between the metal housing to be protected and an auxiliary ground. Resistance of the relay coil is very high, so that when it acts the current flowing is less than 0.1 amp. This makes the coil insensitive to large variations in ground resistance, for which a value of 300 ohms can be allowed. Obviously the point of grounding must have no conductive connection with the metal body to be protected as this would mean short-circuiting the coil and making it ineffective. Thus any available grounding protection wire or grounded neutral wire cannot be used as auxiliary ground for the device.



Relay cuts off supply to equipment as voltage appears on metal parts accessible to touch

The relay coil is designed so that it will trip the switch, under usual conditions, at a voltage of about 20 volts and, in the most extreme cases, at about 35 volts. Since these voltages cannot be dangerous to man, a very reliable protection against dangerous contact voltages has been created, according to *Brown Boveri Review*, which described the device in a recent issue.

Reduce Operating Costs with KEARNEY Products



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It Pays To Use Tripomatics On Constructions Like This

Eliminate possibilities of costly, troublesome cutout failures. Install Kearney Tripomatics and have full guarantee of long-lasting, dependable performance and protection.

Save Time In Locating Those Costly Outages —Minimize Revenue Losses of Interrupted Service

YOU'LL FIND that Kearney Tripomatics — with their self-cleaning, point pressure contacts, sturdy construction and sure-acting doors, which trip-out to indicate a fuse outage — are particularly well adapted for constructions like this, where distribution transformers are installed on rural lines that have a pole top phase wire and a common grounded neutral.

And these Tripomatics, now used by the thousands throughout the country, actually effect worthwhile savings in operating costs . . . no wasted time in locating trouble—open door indicates outage and point of trouble . . . no excessive loss of revenue from lengthy interruptions of service . . . But you can see for yourself how Tripomatics can be used, not only in this case, but others, to help you give better service at lower cost... Full information is yours for the asking. Just write.

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Temperature Affects Energy Output

By WILLIAM W. SCHOMACKER
Statistics Engineer,
Commonwealth Edison Company, Chicago

A recent study of the influence of sunlight and temperature on the daily output* has been made by the Commonwealth Edison Company. With the effect of changes in sunlight eliminated† there remain only two factors responsible for variations in output—temperature and business. By correcting output figures for the effect of temperature the resulting variations in output will be in terms of business only and of value as an indication of business conditions.

By plotting the output for each day of the week corrected for the effect of sunlight, it is possible to determine the normal trend of the output variations except during periods of high temperature in the summer. During the winter months this curve varies almost directly with fluctuations in business. In the summer temperature effects are still present. By giving special consideration to extremely cool days in the summer and to such known business fluctuations as can be determined it is possible to arrive at a yearly output curve for each day of the week (except Tuesday, Wednesday and Thursday, which can be grouped), which varies only by the effects of business.

Subtracting the values on these curves from the curve that included both summer temperatures and business variations, and plotting the differences against the mean temperatures of the corresponding days, a fairly accurate curve (Fig. 1) of the effects of higher temperatures on the light and power output was obtained.

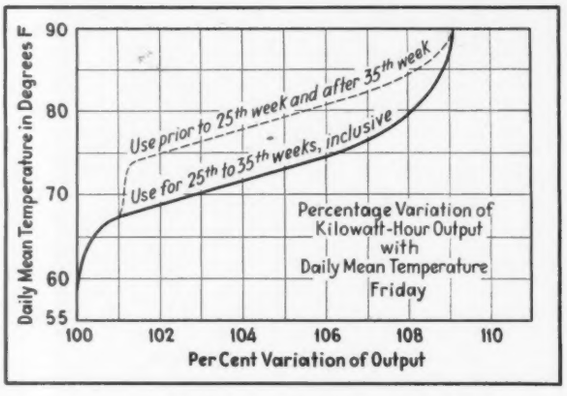

Fig. 1—Variation of output with daily mean temperature

These values can be expressed in per cent, with the kilowatt-hours at 55 deg. F. taken as base output or 100 per cent, since the data show that summer time changes in temperatures below 55 deg. F. have no effect on the output due to refrigeration load.

During the midsummer months, when the earth, streets, sidewalks and buildings are thoroughly impregnated with heat from continuously warm weather, a day with exceptionally high mean temperature, say 80 deg. F., will immediately be reflected in the output used for refrigeration and air conditioning. In fact (see Fig. 1, solid curve) on Fridays the total light and power output will be approximately 8 per cent higher than if the day had a mean temperature of 55 deg. F. However, during the fall or spring, if a day of 80 deg. mean temperature occurs, it would be only 5.5 per cent (see dotted curve in Fig. 1) higher than if the temperature was 55 deg. F.

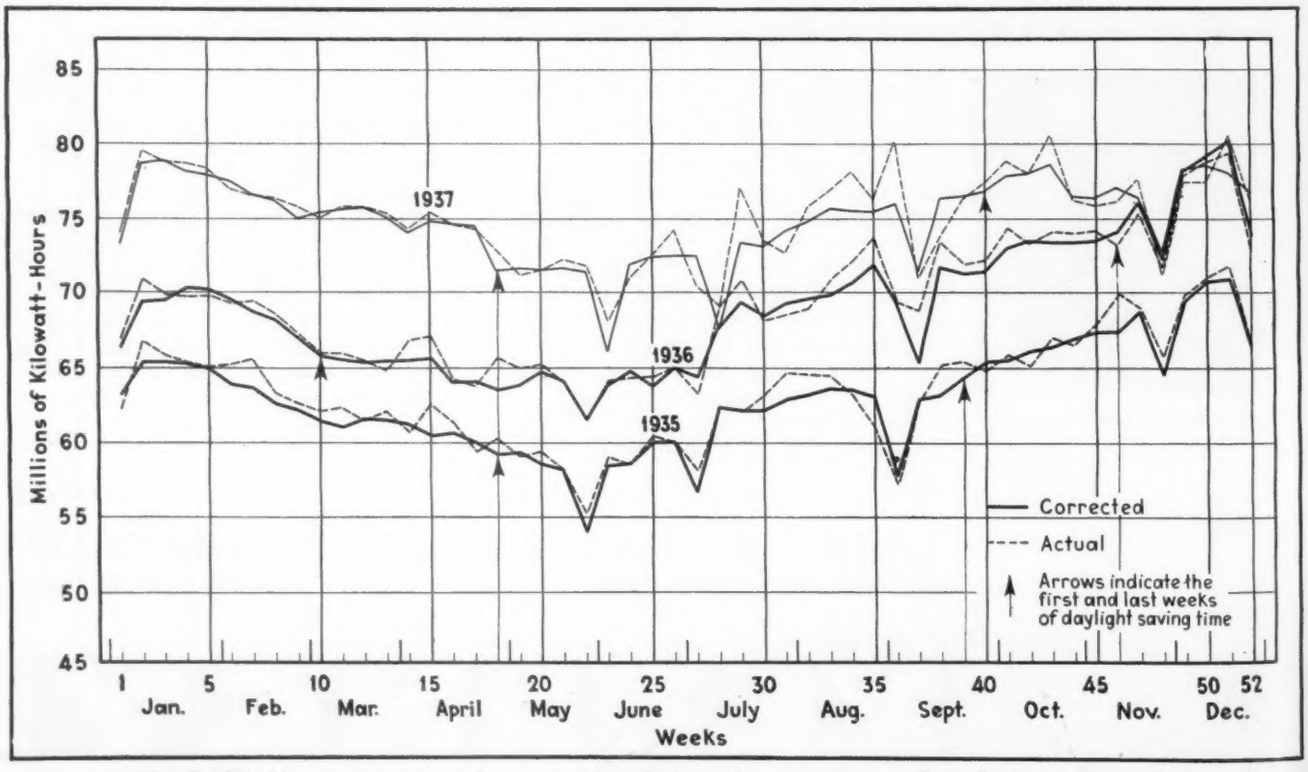

Fig. 2—Weekly output corrected to normal sunlight and temperature reflects business fluctuations

* "Output" as used in this story does not include energy supplied for local transportation.

† See ELECTRICAL WORLD, page 76, June 18, 1938, "Influence of Sunlight on Electricity Output."

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TYPE 660 . . . FOR VOLTAGES UP TO 8,000
TYPE 670 . . . FOR VOLTAGES UP TO 10,000
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Handle most PRIMARY line requirements

■ On line after line they're going up! The three great HEMINGRAYS! They're *tough;* age doesn't mark them. They're *strong;* they defy rigorous service. They're *versatile;* efficiency remains constant. They're *economical;* they reduce initial and over-all costs to a minimum. They're *competent;* they overcome outage loss. All in all, these great new HEMINGRAY Glass, brass-bushed insulators provide a life of better insulator service than has ever been known before. Send for samples—subject them to the most gruelling tests—then watch them *deliver.* Owens-Illinois Glass Company, Hemingray Division, Muncie, Ind.

World's largest manufacturers of glass containers; and producers of INSULUX Glass Block, DUST-STOP Replacement-Type Air Filters, FIBERGLAS Insulating Wool, Insulating Blankets and Electrical Insulation.

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OWENS-ILLINOIS GLASS COMPANY

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Building Up THE LOAD

New ideas and practices in selling electrical equipment and service to commercial and domestic customers

Reschedule Baking to Reduce Demand

By FRANK C. WISE
Power Engineer
Scranton Electric Company, Scranton, Pa.

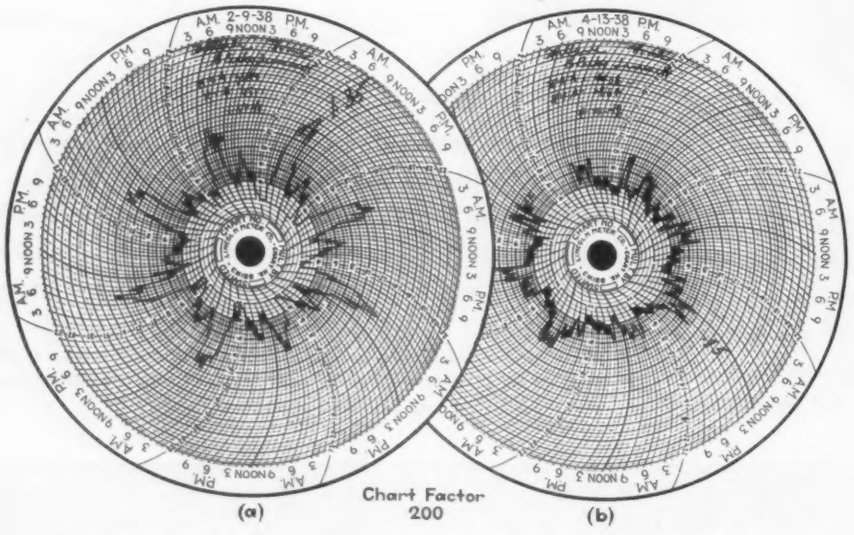
A simple change in the schedule of baking operations in the Hillside County Home suggested by the Scranton Electric Company has been instrumental in not only reducing the institution's power bills about $170 a month but also in insuring the management's continued good will in the face of increasing competition from other forms of fuel.

All baking and cooking at this insituation, which houses 1,200 poor of Lackawanna County, is done electrically. The equipment, which was suggested, planned and laid out by utility specialists, totals 250 kw. The installation includes seven heavy-duty ranges of 24 kw. each, a 54-kw. bakeoven, a 10-kw. roasting oven and 12-kw. cooking top. This load is supplemented by a 100-kw. lighting load, 60 hp. in water pumps, ice-making equipment, etc. A typical month's bill formerly showed a consumption of 78,000 kw.-hr., an average maximum demand of 296 kva. and a total charge of $1,105.

Prior to the change in schedule the 54-kw. bakeoven was thrown on at 6 a.m. to be up to temperature at 7 a.m. when the baker arrived. This arrangement yielded fresh pies at 11 a.m. at the cost of superimposing the baking load on an already sizable breakfast cooking load.

Under the new arrangement day-old pies are the only drawback to a schedule that calls for baking to be done between noon and 5 p.m. In addition all water pumping and ice making is now done at night. Energy consumption is still the same as before, but under the new arrangement demand has fallen from 296 kva. to 186 kva. and the monthly bill from $1,105 to $937 for an average month. This represents a saving of $168 a month. The accompanying demand charts show clearly the effect of the change in schedule on the hour-to-hour demand.

The progressive management of the Hillside Home have expressed themselves as more than pleased with the co-operation given them by the electric service company.



Off-peak baking cuts demand 37 per cent—bill 15 per cent
(a) Before and (b) after changing schedule of baking operations

•

Sodium to Be Tested at Grade Crossings

Under a plan whereby the cost of new sodium lights and their installation will be borne by the Chicago, Milwaukee, St. Paul & Pacific Railroad, the installation will be in charge of Northern States Power Company and the electric service bill will be paid by the city, three sets of General Electric sodium-vapor lamps have just been installed at railroad crossings in Faribault, Minn.

Use of such lights, particularly for danger spots, was based upon the greater volume of light available; second, the unusual color of the light—both of which arouse the driver's extra attention to road hazards—and, third, the ability of the light to penetrate fog and rain.

Tests were made of one light by Faribault city officials, and as a result the City Council has agreed to the installation of five more test lights. The demonstration light used

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in Faribault has been moved to Stillwater, Minn., where similar safety installations are under consideration.

•

Exact Load Records Help Load Building

By R. L. KIDDOO
Empire District Electric Company, Joplin, Mo.

Load-building activity directed toward any class of customers can be carried on much more effectively with, than without, accurate knowledge of the connected loads of individual customers in the class. In other words, if you know what equipment the customer has, you can concentrate your effort on selling him what he hasn't. And in this matter of customer load records there is opportunity for common interest profitable to each between commercial and accounting departments, such as exists in the Empire District Electric Company.

During the past few years the type of commercial lighting schedule which recognizes size of installation has come into rather wide use. For commercial customers of greater than average size demand meters have been used; however, for the bulk of the business, which is in small and medium size customers, the customer's demand has been determined empirically by assessment from the connected load. In the formulation of rates for this class of business a typical customer with a typical demand has often been assumed; however, actual practice reveals that the body of such customers is continually shifting as to kind and quantity of respective connected load.

A demand type of rate based upon an obsolete or inaccurate record of connected load is a source of trouble. There arises a need for a system of regular inventory of customers' connected load; such inventory should cover each customer at least once a year. The record of an individual customer's load should be legible, accurate and made with a minimum of labor.

Having an adding machine with a movable, or shift, carriage, a form about 6¾ by 8½ in. was designed in the accounting department of the company. On this form was provided space for all common appliances, listed in order. This form is inserted in the machine in place of the regular tape. The machine operator lists the customer's total wattage, entering the watt rating for each appliance in the proper space, arriving at the total connected load. From this is determined the customer's billing demand and monthly minimum. A carbon copy is made, also. The information from which this card is prepared is supplied by a field inventory sheet. The same list of appliances found on the load check card appears on the field sheet in the same order, although with greater detail.

The field form is used merely as a tally or check sheet, no calculations being made. The load checker begins his day's work supplied with a pack of these field sheets, each bearing a customer's name and address, but nothing as to the former record of the connected load. When completed, the field sheet is forwarded to the machine operator for preparation of the load card, as above described.

This form has been in use for about eighteen months. Its use has permitted improvement in legibility, accuracy and speed. It has provided a record, which tends to inspire a customer's confidence, and which, as earlier stated, is used to good effect by the commercial department.

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Commercial Selling by Action Photos

Action photographs of recent installations and testimonials from satisfied customers have been among the most effective sales tools used by power salesmen of the Northwestern Electric Company, Portland, Ore., in building up an extensive commercial cooking load.

One example is Hilaire's restaurant in Portland, Ore., with a 50-kw. load and one of the selling pictures of this installation is shown herewith depicting the upstairs kitchen. The prospective customer sees an action picture of electrical equipment at work and his attention is drawn to two fry kettles (total load, 5.4 kw.), a cooking top with a cooking load of 26 kw. and to other electrical equipment in use. A second picture available for salesmen's use is of the downstairs kitchen and shows chefs at work with an 8-kw., two-deck bakeoven and a 5-kw., two-deck roasting oven.

Example of "action photo" used successfully by commercial cooking salesmen of Northwestern Electric Company to bring home the extent to which equipment is being used by other local customers

Good Seeing is Good Business

...WITH MODERN COOPER HEWITT LAMPS

Human eyes are industry's most critical control devices . . . For this reason, if for no other, their well-being is *always* good business. Economizing on lighting is similar to economizing on lubricant for machines.

Good lighting conquers visual strain, it makes work safer, makes surroundings cheerier, and ends the nervous tension that comes from eye fatigue. Employees *see* better, *think* better, *feel* better and *work* better when lighting is engineered to the job. It's one efficiency item that everybody welcomes . . . At the end of a shift in the well-lighted plant, employees leave their work clear-eyed, visually fit for hours of recreation and home life.

Now, too, with the new Cooper Hewitt* Lamps "high seeability" lighting is less expensive than ever before. Plants where costs are known down to the last penny are installing Cooper Hewitts right now—as a means of spreading slim modernization budgets wisely as well as widely throughout the plant.

Why not discuss the possibilities of similar gains in your own plant with a representative who knows the economics as well as the engineering of modern industrial lighting? General Electric Vapor Lamp Company, 805 Adams Street, Hoboken, New Jersey.

*The new Cooper Hewitt starts instantly . . . hangs horizontally . . . gives the same output from 22% less wattage than previous types. It provides a soft, detail-revealing light for non-fatiguing seeing.

GENERAL ELECTRIC VAPOR LAMP COMPANY

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News ABOUT PEOPLE

TVA Promotes A. L. Pauls; Jessup Gets New Assignment

Promotion of A. L. Pauls and George P. Jessup to higher positions on the Tennessee Valley Authority engineering staff has been announced by J. B. Blandford, Jr., general manager of the Authority.

Mr. Pauls, formerly project engineer on Pickwick Landing Dam, has been appointed chief construction engineer with duties relating to all the TVA dam construction projects. He takes over duties formerly performed by T. B. Parker, recently made chief engineer.

Mr. Jessup, who has served as construction superintendent on both Wheeler and Guntersville dams, has been advanced to the position of project manager of the Gilbertsville Dam project.

Mr. Pauls has been with the TVA since 1935. Prior to this association he had more than 25 years of experience on heavy construction work. He has been actively connected with such works as the flood control dams of the Miami Conservancy District of Ohio, irrigation dams with the Bureau of Reclamation and hydro-electric projects of several utilities. His headquarters will be in Knoxville.

Mr. Jessup's record includes more than 25 years of experience as superintendent of construction for the Stone & Webster Engineering Corporation. He has served on many important projects, including hydro-electric dams, buildings and other heavy construction. He will be located both at Knoxville and at the dam site.

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▶ CHARLES V. ALLEN, treasurer of the Westinghouse International Company since 1925, has retired after 45 years' continuous service with Westinghouse. Following graduation from Massachusetts Institute of Technology in 1893, he joined Westinghouse Electric & Manufacturing Company. In 1900 he entered the foreign department of the company at the East Pittsburgh Works. This department later became the Westinghouse International Company. Mr. Allen, who never was employed by any other company than Westinghouse, leaves a record of 38 years' continuous service in the export field.

•

F. A. Coffin Made President of Milwaukee Electric Co.

Frank A. Coffin, sales manager for the Milwaukee Electric Railway & Light Company since 1919, has been elected a vice-president of that company. With enlarged responsibilities, he will continue in charge of sales activities under his new title of vice-president and sales manager.

Before obtaining his engineering degree from the University of Illinois Mr. Coffin worked for the Chicago Edison Company, and upon completing his engineering course at the University in 1909 he returned to the Chicago utility, which had become the Commonwealth Edison Company. He was employed first in construction and station wiring work and then in station designing.

In 1912 he went to the Milwaukee Electric Railway & Light Company as a station designing engineer, but was transferred in 1913 to the sales department to assist in commercial engineering work. In 1914 he was made superintendent of power sales and in the fall of 1919 sales manager.

Mr. Coffin has taken an active interest in civic and business organizations. He has served the Milwaukee Association of Commerce for several years as chairman of its industries committee. In 1936 he served as president of the Wisconsin Utilities Association.

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▶ CHARLES I. BURKHOLDER, vice-president and chief engineer of the Duke Power Company, was honored recently with the degree of doctor of engineering by North Carolina State College.

▶ WESLEY P. SYKES, metallurgical engineer at the Cleveland Wire Works of the General Electric Company, was recently awarded the honorary degree of Doctor of Engineering at the commencement exercises of the Case School of Applied Science, Cleveland. After the war Dr. Sykes entered the General Electric Company, where he became interested in the study of the operations and production of pure tungsten and molybdenum metals in wire form. The development of new alloys containing these two metals has comprised the major part of his work and he has published many technical papers on the subject of metals. He is considered an outstanding authority on these metals and his writings have been translated into seventeen foreign languages.

▶ BEN CLARK, who is retiring as chief inspector of the Detroit Electrical Inspection Bureau, will have completed 33 years of service as head of that department on July 31. Mr. Clark started his career in the meter test department of the General Electric Company at West Lynn in 1888 and from there he went to Detroit as meter engineer for the Detroit Edison Company. In 1903 he became an electrical inspector and was appointed chief in 1905. Since that time many of the rules developed in his office have been carried into the Code. Mr. Clark is an active member of the western section of the Inter-

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To illustrate: A sulphite digester insured by this Organization exploded at one of the world's largest paper mills in New Hampshire.

The accident occurred at five in the evening. Next morning our Chief Engineer and two assistants were at the plant to start the work of reclamation. They stayed on the job, working day and night, until partial operation of the mill could be resumed.

The digester, which was 49 feet high and 15 feet in diameter, had been excellently maintained and frequently inspected. The accident is an impressive illustration of the uncertainty of pressure equipment in spite of mechanical safety devices and diligent care.

The loss was more than $300,000. We paid in full for property damage, loss of production and personal injuries. Our check was delivered to the Assured less than one week after the amount of the loss had been determined.

Your Insurance Advisor will be glad to tell you more about "Ocean" and "Columbia" Power Plant Protection.

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Pacific Department: 315 Montgomery Street, San Francisco, California
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Cuban Correspondent: Compania Cubana de Fianzas, Amargura 23, Havana, Cuba

national Association of Electrical Inspectors and a charter member of the Electrical Council of the Underwriters Laboratories. He will continue his interest in things electrical as a consulting electrical engineer.

▶ H. HOBART PORTER, chairman of the board of the American Water Works & Electric Company, has been awarded the honorary degree of doctor of engineering by Rensselaer Polytechnic Institute.

▶ MORTON G. LLOYD, chief of the section of safety codes, National Bureau of Standards, Washington, D. C., has been elected president of the Washington Safety Society, an organization recently formed in the District of Columbia. Dr. Lloyd is also a representative of the Department of Commerce upon the Federal Interdepartmental Safety Council, which was organized a year ago to encourage, correlate and systematize the accident prevention work among government employees in the various departments and independent stablishments of the federal government.

▶ WILLIAM L. ENFIELD, manager of the General Electric incandescent lamp department's lamp development laboratory at Nela Park, Cleveland, recently received the degree of doctor of engineering from Kansas State College of Agriculture and Applied Science at Manhattan, Kan., on the occasion of the latter institution's seventy-fifth anniversary. The honor was paid Mr. Enfield in recognition of the outstanding service he has rendered in the advancement of lighting progress since his graduation from Kansas State College in 1909.

▶ ROBERT L. SACKETT, dean of the school of engineering at Pennsylvania State College from 1915 to 1937, was made the recipient of the Lamme Medal by the Society for the Promotion of Engineering Education for achievement in this technical field. Dr. S. B. Earle, president of the society and dean of engineering at Clemson Agricultural College, made the presentation at the society's annual convention dinner. The citation listed among the reasons for Dean Sackett's selection as a medalist "his work in co-ordinating the thought of industry and education for the improvement of their understanding of their mutual problem in selecting and developing potential leaders." Since his retirement as dean at Pennsylvania State College, Dean Sackett has devoted himself largely to the work of the Engineering Council for Professional Development. He is a past-president of the S.P.E.E.

Canadian Westinghouse Co. Makes New Appointments

Election of W. E. Sprague and H. A. Cooch as vice-presidents of the Canadian Westinghouse Company, Ltd., was announced following a recent meeting of the board of directors.

Mr. Sprague began his Westing-

house career in 1899 with the Westinghouse Air Brake Company at Pittsburgh, and has been in charge of the air brake business of the Canadian Westinghouse Company for many years. In 1918 he was elected secretary of the company, which office he still retains.

A graduate in electrical engineering of the University of Toronto, Mr. Cooch has been with Westinghouse

since 1910, except for three years overseas war service. He has held the position of assistant to vice-president in charge of sales since 1924, previous to which he was located in the Toronto office.

•

▶ E. W. FOWLER has been appointed manager of the Champaign office of the Illinois-Iowa Power Company, succeeding JOHN W. MCKEE, who has served in that capacity for the past ten years. Mr. McKee becomes a member of the engineering department of the organization. Mr. Fowler was formerly manager of the Ottawa and Decatur offices and the general office in Peoria.

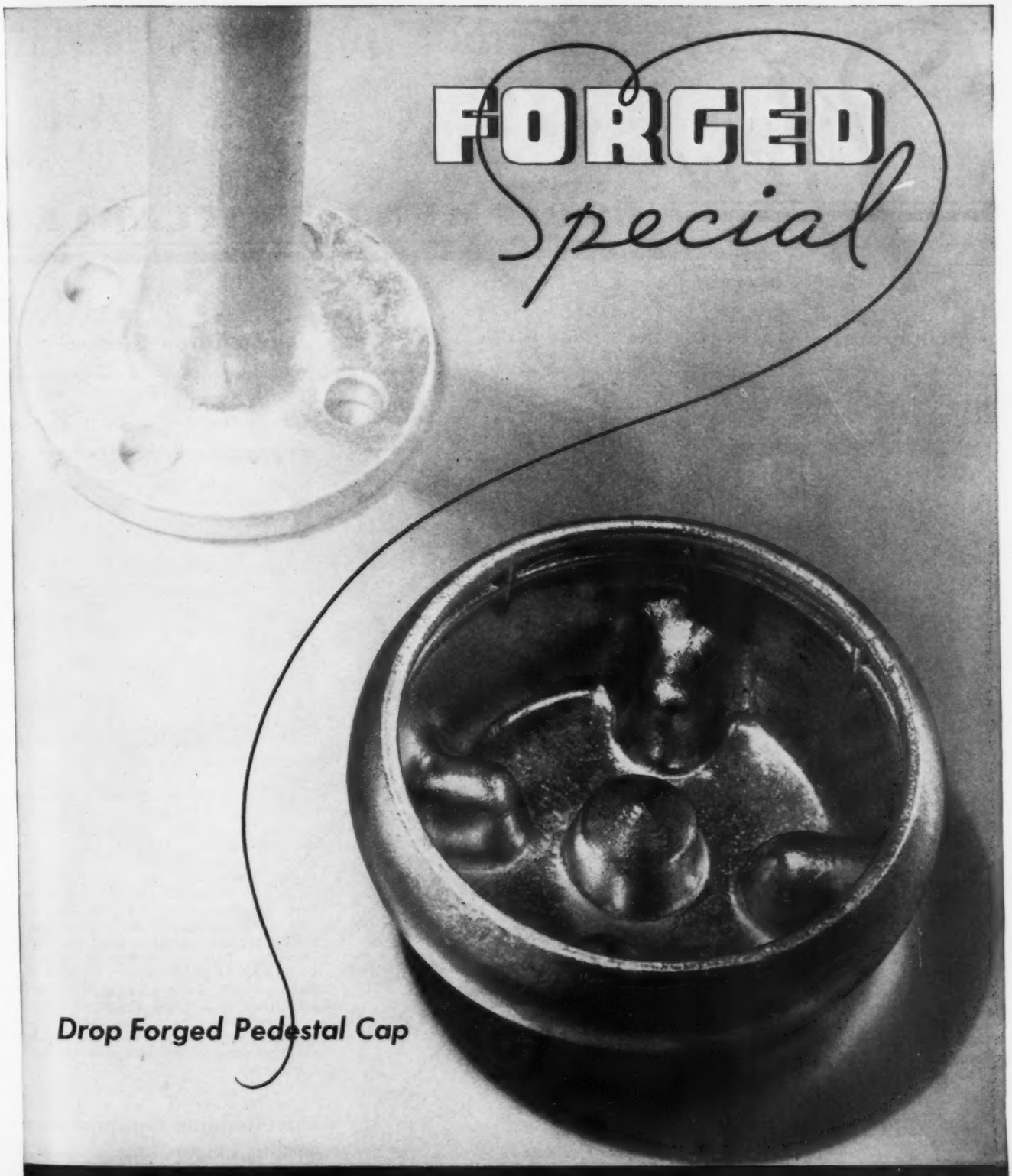
OBITUARY

▶ B. A. BEARNES, manager of the Interstate Power Company, at Albert Lea, Minn., died June 14.

▶ DOUGLAS L. FURNESS, a sales engineer in the industrial department of the General Electric Company at Boston, Mass., died suddenly at Salem, Mass., on June 19. He was born in Rochester, N. Y., 55 years ago and shortly after being graduated from Harvard College in 1904 entered the employ of the company.

▶ HENRY A. RATCLIFF, chief electrical engineer, London Power Company, Ltd., London, England, died April 26, in his sixty-second year. Mr. Ratcliff became a member of the staff of the Manchester Corporation Electricity Department, where he held various positions, eventually becoming superintendent-electrical engineer in 1921. Concurrently he served for many years as lecturer in the Manchester College of Technology. He became chief electrical engineer of the London Power Company in 1928. Mr. Ratcliff received his technical education at the University College, Nottingham, England, his native city. He was a member of the American Institute of Electrical Engineers.

▶ SIR JOHN SNELL, electrical engineer who sponsored the present national "grid" system of power distribution in Great Britain, died July 6, at the age of 68. He retired in January from the chairmanship of the government's Electricity Commission, which he had held since its establishment in 1920. Sir John was regarded by successive governments as one of the ablest advisers on power distribution. He had headed a large number of committees that investigated efficient development of the electricity supply. Many honors were conferred upon him in the course of his distinguished career. He was awarded the Faraday Medal by the British Institution of Electrical Engineers in 1937 for conspicuous service to the advancement of electrical science. He was a past-president of the institution and was a fellow of the American Institute of Electrical Engineers. Besides numerous articles in the scientific and technical press, Sir John had written a book on "Distribution of Electrical Energy" and one on "Power-House Design."



FORGED by B.T.C.

THROUGH YOUR INSULATOR MANUFACTURER ONLY

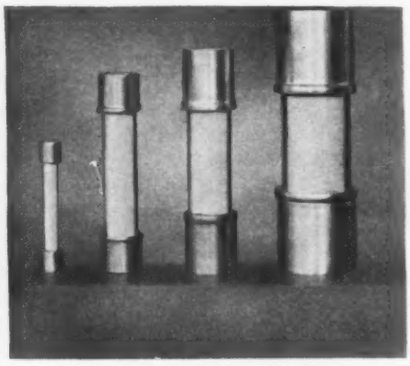
IF IT'S HI-LINE HARDWARE, B. T. C. CAN FORGE IT

THE BREWER-TITCHENER CORPORATION, CORTLAND, NEW YORK

New EQUIPMENT AVAILABLE

Current-Limiting Fuse

Described at the recent A.I.E.E. meeting in Washington, this high-voltage power fuse is said to limit short-circuit current to a value substantially below that usually



Type "EJ-1" current-limiting fuse; four sizes of 2,500-volt fuses shown; also offered in N.E.M.A. current ratings up to and including the following: 2,500 volts, max. ratings, 250-150N; 5,000 volts, 200-125N; 7,500 volts, 150-100N; 15,000 volts, 150-100N; 23,000 volts, 100-70N. **General Electric Co.,** Schenectady, N. Y.

encountered in short-circuit interruptions. It consists of an interrupting element of one or more silver wires wound on a supporting core of high temperature ceramic material and imbedded in an interrupting medium of granular quartz. Unit is inclosed in a Pyrex tube with a metal ferrule at each end. A target wire welded to upper connection strip passes through the center of the core and terminates in a chamber, at the bottom, containing a small quantity of gas-producing chemical. Below the chemical chamber a thin copper target is arranged to curve outwardly if fuse is blown.

•

Cords and Cables

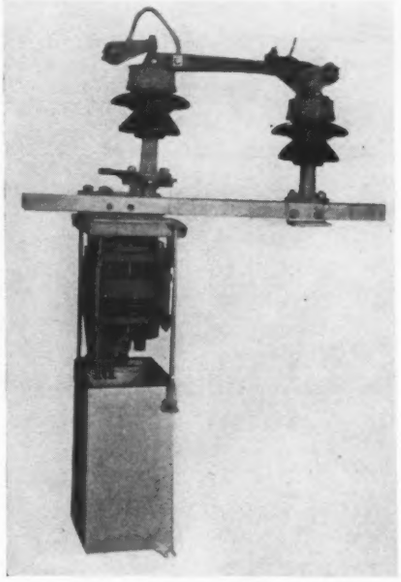
Toughness with elasticity is claimed for this new line of cables and cords which feature a 60 per cent "rubber armor." Portable power cable is pictured; copper conductors are covered with 30 per cent insulation, having colored insulation tracers. Over this assembly is a 40 per cent rubber jacket to hold the conductors firmly but not effect their flexibility. A double seine-twine reinforcement is applied in reverse directions over this jacket. Finally comes the 60 per cent rubber armor, and then the cable is vulcanized in metal molds under high pressure. "Triaprene" cords and cables, in which the outer jacket is compounded with Neoprene, are also offered.

"Tricord" cords and cables; three-conductor type "W" portable power cable shown. **Triangle Conduit & Cable Co.,** Elmhurst, New York City, N. Y.

•

Automatic Line Sectionalizing

Automatic line sectionalizing equipment is designed to locate and isolate permanent trouble on extended transmission lines without supervision. First, all line sectionalizing switches are opened, then closed one after the other until the defective section is found. Finally, line switch

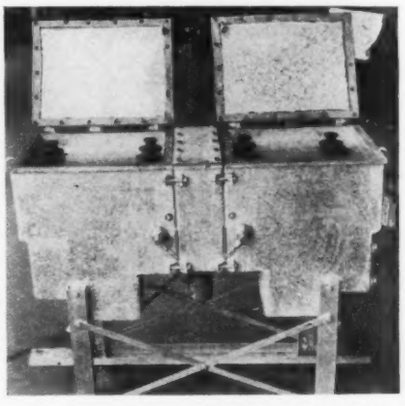


"Ro-Bo" type "B"; mechanism cover lowered; type "A" not shown, includes a three-pole switch and motor mechanism; for use on 161 kv. and less. **Southern States Equipment Corp.,** Birmingham, Ala.

nearest trouble is reopened and left open, and service resumed on other parts of system. Type illustrated is made for rural use at 23 kv. and less. Motor mechanism is small enough to be suspended from channel base on one switch unit, making a one-pole, self-contained unit. For two- or three-pole switches, other units are connected to motor-unit by usual interphase pipe.

Double-Throw Breaker

This double-throw oil circuit breaker consists of two independently operated oil circuit breakers mounted on a common chassis with a load tap junction box



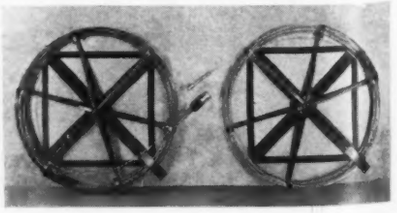
Double-throw oil circuit breaker; 15-kv. size; in 100 and 200 amp. capacities, 7,500 and 15,000 volt ratings. **Electrical Engineers Equipment Co.,** Melrose Park, Ill.

between the two. Outgoing circuit, generally consisting of three single-conductor cables, enters load tap junction box at either the bottom or the top, as desired. Two incoming power circuits, three-conductor cables, enter oil switch in compartments that are integral parts of the circuit breaker. Each oil switch is equipped with bayonet-type disconnects on both line and load side. Cover of each oil switch is interlocked with circuit breaker so that it is impossible to open cover until circuit breaker is in open position. Oil switches are hand operated, not equipped with automatic trip.

•

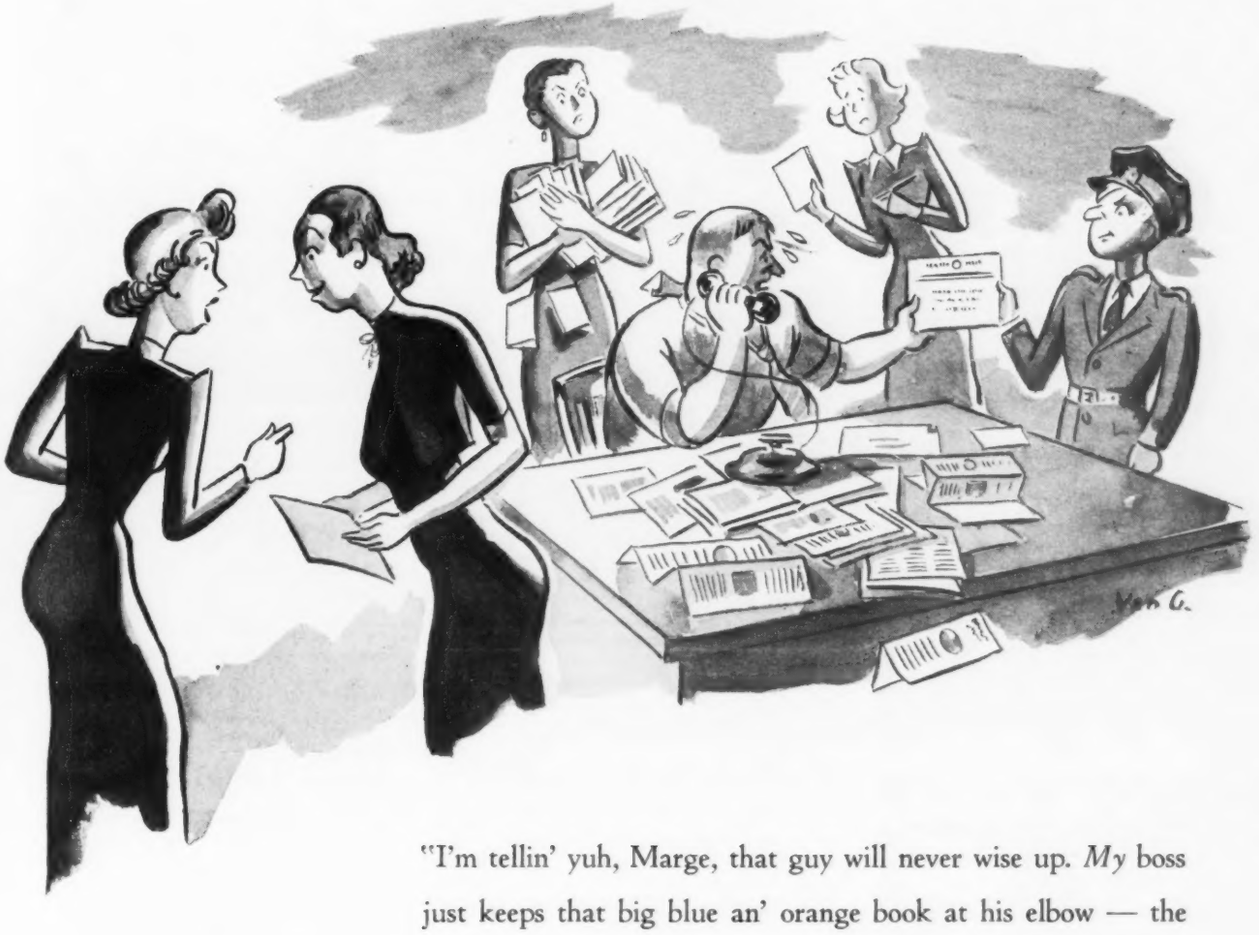
Duct-Rodding Equipment

New duct-rodding equipment consists of lengths of spring steel wire to which are attached leader and pick-up fittings so that firm attachment may be made in the duct by lengths entering the two duct



Spring steel dust rodder. **Electroline Co.,** Chicago, Ill.

"He's looking up some electrical gadget —*the hard way*"

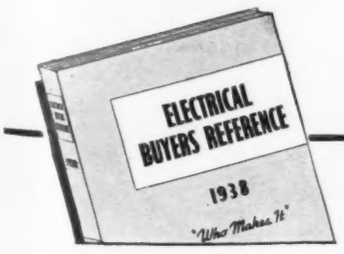


"I'm tellin' yuh, Marge, that guy will never wise up. *My* boss just keeps that big blue an' orange book at his elbow — the Electrical Buyers Reference. An' boy, does *he* know all the answers!"

Are you getting the most out of *your* copy of the Electrical Buyers Reference? When you need the name and address of a manufacturer, the B.R. will give it to you in one minute. And it's cross-indexed by trade names so you *can't* go wrong.

Use your copy regularly. It will save you time and money!

The Looking-Up-Place for Everything Electrical



ELECTRICAL BUYERS REFERENCE

ELECTRICAL WORLD EDITION

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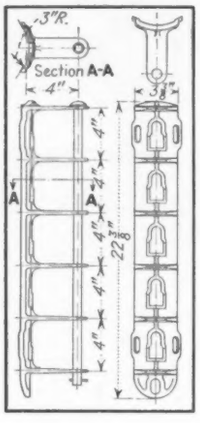
ends. Connector fittings are detachable so they may be changed or replaced by mandrels, swabs or other tools. Standard equipment consists of two reels—one with 300, the other with 400 ft. of wire—one pick-up and two leader units and a tool for separating the joined fittings.

•

Secondary Rack

Main part of this secondary rack assembly is the malleable rack casting, in one piece to provide greater strength and longer useful service period. Designed for standard 8-in. spacing with standard 3-in. insulators, the top of the rack is of the non-extended type, while the bottom is extended, providing facilities for mounting with two through-bolts or through-bolt and lag or drive screw. Lower half of each bolt slot is enlarged so that the completely assembled rack may be hooked on projecting heads of the attaching through-bolts already in position on the pole.

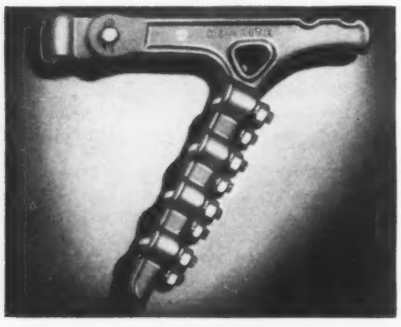


"PA601" universal type 8-in. spacing secondary rack. **Malleable Iron Fittings Co.,** Branford, Conn.

•

Strain Clamp

To provide a strain clamp suitable for dead-ending high tensile strength ground wires and conductors, required for river crossing and other long-span, heavy-load construction this company has brought out this heavy-duty clamp. With an ultimate strength of 32,000 lb., it is claimed that it will develop in excess of 90 per cent of the ultimate of high strength ground wires. Its slip strength is said to be more than adequate for use with any copperweld or high tensile strength copper alloy and steel conductors in the sizes it accommodates.



"Hi-Lite" heavy-duty strain clamp; with liners, takes cables from 0.275 to 0.54 in.; without liners, takes cables from 0.3125 to 0.625 in. **Ohio Brass Co.,** Mansfield, Ohio.

•

Current Transformers

Combination "through" and "tapped" construction is used in these portable current transformers. "Through" capacities of 1,000, 500 and 250 amp. are obtained by passing the conductor through the opening. Capacities of 100, 50, 25 and 10 amp. are provided with terminals mounted on top of the case. Secondary terminals are marked and provided with short-circuiting switch. When device is used with triple-range ammeter of 2-5-10 amp. capacity currents from 20 to 2,000 amp. may be measured with a single hook-up.

Type "PC-137" portable, multi-range current transformer. **Westinghouse Electric & Mfg. Co.,** East Pittsburgh, Pa.

•

Industrial Truck Battery

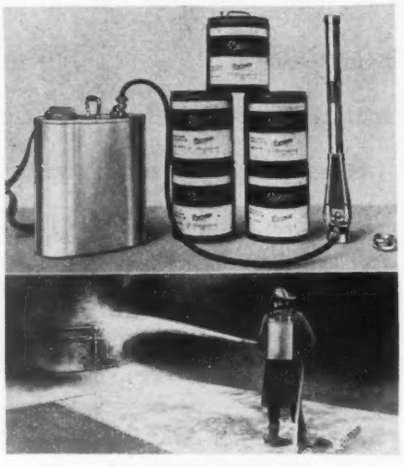
Type "MEH"; 18 cells, 21 plates; capacity, 1,000 amp.-hr. or 34.4 kw.-hr.; 24-cell size, with 21 plates per cell, has capacity of 45.9 kw.-hr. at normal discharge rate. **Electric Storage Battery Co.,** Philadelphia, Pa.

Not long ago this company announced a new and super-type of electric industrial truck battery (type "FLM" announced in ELECTRICAL WORLD for October 9, 1937). Now it has developed a second super-type, with more power than the first one. It is said to have capacity enough to provide power and speed to operate trucks of 30,000 lb. or more capacity for twelve or more hours on one charge.

•

Fire-Fighting Equipment

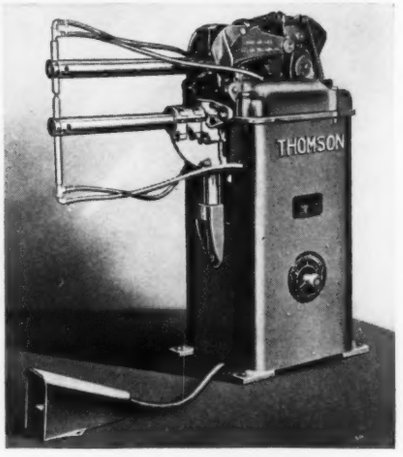
This larger capacity play pipe is said to make from 500 to 750 gal. of fire-smothering foam per minute. Device converts a water stream into a foam stream by mechanical rather than chemical action, using a "Phomaide" solution. When the pipe is connected to a hose line and the water turned on the solution and air are drawn into the water stream to form foam. This operation may be continued by pouring the solution into a knapsack carried on the operator's back.



Model PP24 "Phomaire" play pipe. **Pyrene Manufacturing Co.,** Newark, New Jersey.

Spot Welder

Unlike many motor-driven spot welders which are essentially foot-operated machines with motor drives added, this welder is designed specifically to be power driven. Mounted on the head casting, the drive mechanism consists of a worm reduction and clutch driven by a ½-hp., 1,200-r.p.m. motor through a pair of three-step pulleys, providing speeds of 42, 53, 66, 81, 101 or 127 spots a minute. Pressure is supplied by cam driven by worm reduction unit and acting on rocker arm into which upper welding arm is clamped. Hardened nut bearing against anti-friction thrust bearing provides means for regulating pressure from approximately 200 lb. minimum to 800 lb. maximum. Heat regulation is obtained with five-point regulator.



"G" series welder; throat depths, 12, 18 or 24 in.; transformer capacities, 20, 30, 40 or 60 kva. **Thomson-Gibb Electric Welding Co.,** Lynn, Mass.

•

Ground Resistance Measurements

New instrument for measuring ground resistance of lightning arrester grounds, transmission tower footings, transformer grounds, and the like, is 50 per cent smaller and 40 per cent lighter than previous model. However, it has the same type of measuring system and same generator used in the company's Model "C," which it replaces.

Model **"JP" Ground-Ohmer;** in five range combinations—10 and 100; 10, 100 and 1,000; 100, 1,000 and 10,000 ohms. **Herman H. Sticht & Co.,** New York, N. Y.

M. O. Pump-Priming Joker

[*Continued from page 46*]

has decided not to permit any *outside* counsel to cross-examine the Lilienthal witnesses. It has appointed a man as committee counsel who the Lilienthal crowd thinks is an ardent New Dealer. Finally, they have noticed that Dr. Morgan leans over so far backward to be "fair," and has shown such a scorn of using any line of attack which does not square 100 per cent with his personal judgment, that they are not afraid of him.

They still don't like it

After all, they point out privately, Dr. Morgan actually is in sympathy with the whole project. It is only details, they point out, on which there are differences. They have already deprived him of the only two points on which they think he could possibly interest the public—the Berry marble case and the allocations of cost as between power, navigation, flood control, etc. They think he reached his high point at the White House hearing which resulted in his being fired—slipped down a little from that eminence when he appeared before the committee, and that anything to come will be an anti-climax.

But they don't like the court proceedings. Which causes some wonder. Why should they be worried even if the Supreme Court does reinstate Dr. Morgan? He would still be a helpless minority. What are they afraid he could then do? Lots of Washington observers, familiar with this fear, are wondering at its intensity.

•

Proposes Private Loan

Consolidated Edison Company of New York, Inc., and the Yonkers Electric Light & Power Company, a subsidiary, are negotiating with the Metropolitan Life Insurance Company and the Prudential Insurance Company for private placement of $9,515,000 of 3½ per cent debentures of the Yonkers company; F. N. Nickerson, vice-president of Consolidated Edison, testified at a recent hearing before the Public Service Commission. Proceeds of the issue will be used to pay advances from the parent company. If the financing is carried out it will be the second Consolidated Edison System bond issue to be sold privately this year.

Transformers for indoor installation

AMER TRAN

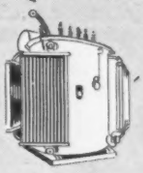
EXPENSIVE fire-proof vaults are no longer necessary for transformers located indoors. New AmerTran Abestol*-Cooled Transformers may be installed wherever they are required with many restrictions applying to oil-immersed equipment removed. Because they are fireproof, they may be placed near the load . . . installation costs are substantially reduced . . . appearance is improved . . . performance, efficiency and safety are unimpaired. May we send you more detailed information on transformers for your needs?

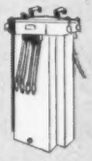
* Abestol is a registered trademark name for a noninflammable, nonexplosive insulating fluid of the askarel family which is used as a coolant in place of transformer oil in especially designed and constructed AmerTran distribution and power transformers. Its use is licensed by General Electric Co. under the Pyranol patents.

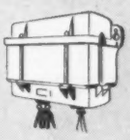
AMERICAN TRANSFORMER CO.
178 Emmet St., Newark, N. J.

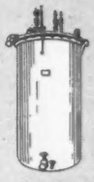
AMERTRAN

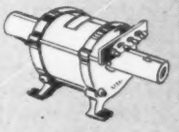
a few AMERTRAN PRODUCTS


POWER TRANSFORMERS

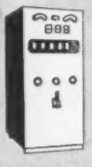

DISTRIBUTION TRANSFORMERS


AIR-COOLED TRANSFORMERS


TESTING TRANSFORMERS


INSTRUMENT TRANSFORMERS

VOLTAGE REGULATORS


ELECTRONIC RECTIFIERS

Manufacturing AND MARKETS

Drop in Orders Shown by General Electric

Orders received by General Electric Company during the first six months this year totaled $128,233,823, as against $217,265,619 in the same period last year, a decrease of 41 per cent, according to Gerard Swope, president.

Mr. Swope stated that orders received during the second quarter this year totaled $62,847,423 as against $111,518,589 during the corresponding quarter last year, a decrease of 44 per cent.

•

Machinery and Refrigerator Exports Show Losses in May

Exports of electrical machinery and apparatus during May totaled $8,552,000, against $9,359,000 in April and $10,374,000 in May last year, according to the Department of Commerce. For the first five months these exports were $43,385,000, against $45,971,000 in the same period last year.

Exports of household refrigerators during May totaled 13,001 valued at $935,000, against 17,008 valued at $1,208,000 in April and 22,375 valued at $1,641,000 in May last year. For the first five months these exports totaled 66,594 valued at $4,883,000, against 83,222 valued at $6,125,000 in the same period last year.

•

Elec-Tri-Center Kitchens

Westinghouse Electric & Manufacturing Company has issued a new booklet on kitchen planning with a color presentation of the Elec-Tri-Center kitchens.

•

Shows Profit Gain for Year

For the year ended March 31 Genera Electric Company, Ltd., reports profit on trading and income from investments of £1,772,181, compared with £1,604,512 in the preceding year. After deductions for depreciation, directors' fees, contribution to pension fund and transfer to taxation reserve, including provision for National Defense Contribution, there was a net profit for the year of £954,244, against £935,859 in the previous year.

•

Electric Cable Contracts

Contracts for electric cable totaling $295,323 have been recently awarded to four companies by the Department of Labor, with the Navy as purchasing agent. The contractors and their prices follow: Anaconda Wire & Cabe, two contracts, $59,752; Habirshaw Cable & Wire, two contracts, $98,048; Okonite, one contract, $83,412; Rockbestos Products, two contracts, $54,111.

•

Truck Shipments Higher

Domestic shipments of electrical industrial trucks and tractors during May, as reported by ten manufacturers representing the entire industry, totaled 63, against 57 in April and 158 in May of last year, according to the Department of Commerce. For the first five months such shipments amounted to 362, against 726 in the same period last year.

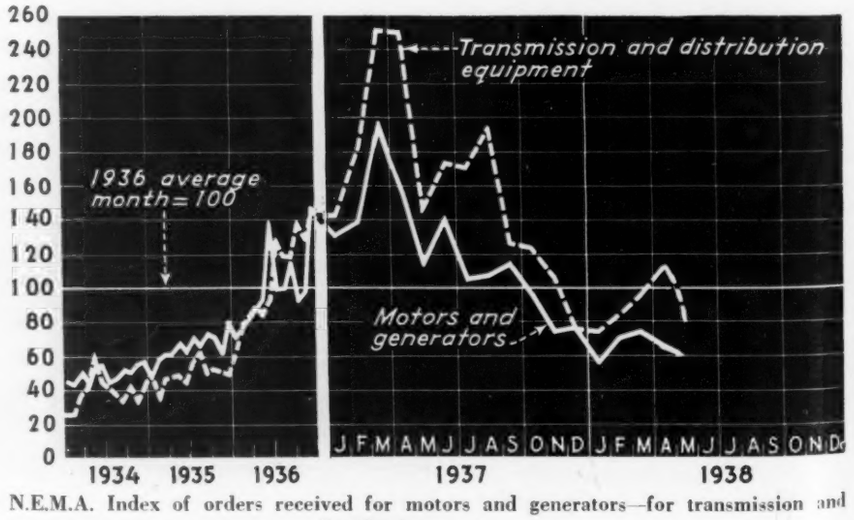
N.E.M.A. Reports May Orders Under April

Orders received for motors and generators in May were 6.2 per cent less and orders for transmission and distribution equipment were 26.6 per cent less in value than those in April, according to index numbers announced by the National Electrical Manufacturers Association. Compared with May, 1937, both items are down 45 per cent. This is a relative improvement over April.

Index numbers, based on the average month of 1936 as 100, are given in the table, which is an extension of the one that appeared in the ELECTRICAL WORLD of July 9, on page 18. The classification "Motors and Generators" comprises engine and belt-driven generators, a.-c. and d.-c. motors (1-200 hp.) and synchronous motors (1 hp. and larger).

"Transmission and Distribution" comprises high-voltage insulators, paper and varnished-cambric cable, power switching equipment and transformers.

	Motors and Generators		Transmission and Distribution	
Month	1937	1938	1937	1938
March	196.4	74.7	251.5	96.3
April	158.9	66.6	250.1	111.1
May	113.4	62.5	147.2	81.6



N.E.M.A. Index of orders received for motors and generators—for transmission and distribution equipment

Thomas Mono Type Insulators

Thomas No. 1917-M
Nominal Rating
27 Kv. →

Thomas No. 1925-M
Nominal Rating
35 Kv. →

Thomas No. 1924-M
Nominal Rating
45 Kv. →

Dry Flashover, Kv.	95	110	125
Wet Flashover, Kv.	65	75	85
Leakage Distance, Inches	13	17	20
Dry Arcing Distance, Inches	8	9-1/2	11
Wet Arcing Distance, Inches	4	5	5-3/4
Mechanical Strength, Pounds	2,500	3,000	3,000
Net Weight, Pounds	750	1,100	1,270

In certain sections it has been found that One Piece Insulators of heavy massive construction are exceptionally free from malicious breakage due to missiles or gun fire.

Thomas Engineers have designed the above "Mono Type" Insulators covering a wide range of voltage applications and incorporated the feature of a heavy central porcelain mass surrounding the pin without appreciably sacrificing desirable leakage and flashover characteristics. Because of their exceptional ruggedness, heavy balanced design, and great stamina, abusive operating conditions are seldom found too severe for Thomas "Mono Type" Insulators.

OUR 65TH YEAR

UNDER ONE NAME "THOMAS"

THE R. THOMAS & SONS COMPANY, . . LISBON, OHIO

Manufacturers Make Sales Assignments

Electrical manufacturing companies have recently made the following appointments to their sales staffs:

A. B. Chance Company has announced the opening of a New York office to promote the sale of the A. B. Chance-Tips Tool Company products in that territory. The new office will be located at 50 Church Street, and will be under the supervision of Paul K. Rhoads, who is being transferred from the company's office at Centralia, Mo., where he has been sales manager of the Tips Tool division of the A. B. Chance Company.

Mueller Electric Company has announced the appointment of two new sales agents for the Mueller line. Fred Somers of Kansas City will represent the company in Missouri, Iowa, Nebraska and Kansas. Walter W. Boyd of Chicago will represent the company in Illinois and eastern and southern Wisconsin.

•

Refrigerator Sales Down

Domestic sales of electric household refrigerators during the month of May totaled 167,185 units, compared with 309,767 units in May, 1937, according to an announcement made by the National Electrical Manufacturers Association. The report was based on returns received from 17 companies. For the five months ended May 31, domestic sales amounted to 759,906 units, compared with 1,337,407 for the similar period of 1937. World sales in May amounted to 183,870 units, compared with 333,869 units in May, 1937, and for the five-month period totaled 839,249 units compared with 1,444,461 units for the similar period of 1937.

•

Gets Copper Wire Award

The Los Angeles Water and Power Commission, Los Angeles, Calif., has awarded a contract to the U.S. Rubber Products, Inc., Passaic, N. J., for 151,000 lb. of weatherproof copper wire at a price of $22,639. The award covers 20,000 lb. of No. 8, at $15.72 per cwt.; 40,000 lb. of No. 6, at $15.12 per cwt.; 65,000 lb. of No. 4, at $14.82 per cwt., and 26,000 lb. of No. 2 at $14.67 per cwt.

New York Metal Prices

	July 6, 1938 Cents per Pound	July 12, 1938 Cents per Pound
Copper electrolytic	9.75*	9.75*
Lead Am. S. & R. price	4.75	4.90
Antimony	11.250	11.250
Nickel ingot	35.00	35.00
Zinc spot	5.15	5.15
Tin straits	43.50	42.75
Aluminum, 99 per cent.	20.00	20.00

* Delivered Connecticut Valley.

"MEGGER"
GROUND TESTER

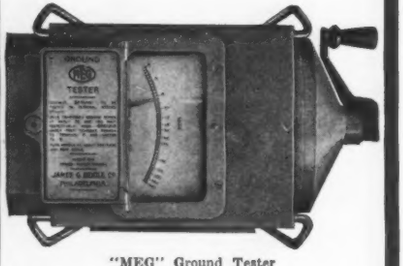
"MEGGER" Ground Tester

WHAT PRICE POOR GROUNDS?

Tests and field experience indicate that measurements of ground resistance are essential for adequate protection against lightning, for proper system relay operation, and for human safety.

"Megger" and "Meg" Ground Testers have contributed to grounding and ground testing the same features of accuracy, simplicity, ruggedness and reliability, that are so characteristic of "Megger" and "Meg" instruments for testing insulation resistance. Need more be said?

Catalog 1425-W contains a full description of these instruments, including principle of operation and suggestions for their application. Your copy will be sent on request.



"MEG" Ground Tester

JAMES G. BIDDLE CO.
ELECTRICAL INSTRUMENTS
1211-13 ARCH STREET PHILADELPHIA, PA.

Other Biddle Specialties:

"Megger" Insulation Testing Instruments
"Megger" Capacitance Meter
"Megger" Direct-Reading Ohmmeters
"Ducter" Low Resistance Testing Sets
"Dionic" Water Tester
"Frahm" Vibrating-Reed Tachometers and Frequency Meters
"Jagabi" Rheostats
"Jagabi" Speed-Measuring Instruments

Field Reports on Business

Orders for electrical equipment for industrial use continue to show improvement both in dollar value and number. Utility buying continues small; however, prospects are for expanded purchases in the fall. Rural line construction is proceeding with new areas to be opened this summer.

PACIFIC COAST

The June volume of building permits for the seven Pacific Slope states recorded an 8 per cent drop below the previous month, which had registered many large public jobs, and only 4 per cent below June, 1937. A $1,000,000 50-acre home project in the Twin Peaks section of San Francisco is projected. California employment has declined 15 per cent over this season in 1937, the machinery and refrigeration firms registering the low of about 30 per cent.

Wholesalers' salesmen report better orders, which, though stimulated by sharp copper wire price increases and by steel conduit decreased to secure tonnage, reflect the widespread better buying spirit.

Recent PWA allotments include $1,000,000 for Alcatraz Prison, with provision for a new power plant and distribution system; $4,500,000 for Mare Island Navy Yard, of which 10 per cent covers a new power plant; $1,500,000 for quarters and barracks for Presidio military reservation, and a like amount contemplated for service and distributing systems at the Alameda Naval air base, all these being in the San Francisco Bay area. Government awards for the Kendrick project in Wyoming cover $174,090 for American transformers, $67,600 for Pacific disconnect switches and about $50,000 for main control equipment, largely Bowie switches.

NEW ENGLAND

A gratifying improvement in industrial activity continues to stimulate inquiries, which are bearing fruit in diversified orders for electrical supplies and material. National Biscuit, Cambridge, has purchased about 60 motors aggregating about 300 hp. in connection with a $500,000 modernization program, signing up for five years of central-station service. Massachusetts Institute of Technology has contracted with Cambridge Electric Light for about 4,000 kva. of service, and Lever Brothers, in the same city, is adding 1,000 kva. in transformer capacity for factory use. A 400-hp. air-conditioning installation will be made in a new office building which will be constructed by the Stone & Webster Engineering Corporation for this concern.

President W. S. Wyman of Central Maine Power states that if the business pick-up continues the dam for the proposed Solon hydroelectric plant will be built this fall. A new transmission line about 13 miles long, designed for 110-kv. service and built of No. 4/0 ACSR conductor with Pyrex insulators on H-frames, has been energized for preliminary 22-kv. operation between Acushnet and Tremont, Mass. Granite State Electric has built a new 2,000-kva. substation at Lebanon, N. H.

Twenty-six all-electric home real estate developments involving 429 houses are under way in the Boston Edison Area. Of these, 209 houses have been erected. Ten per cent are provided with electric water heaters.

Commercial lighting is active, two floors of the Public Service building in Boston having just been modernized to 25 ft.-candle intensity, using 300- and 500-watt silver bowl type reflectors. At Medford a new swimming pool has been equipped with 6 kw. in floodlighting, 900 watts in general lighting and 15 hp. in motor-driven pumps.

NEW YORK

Utility construction is showing signs of expansion on a limited scale. Rural lines are being extended, with New York State Electric & Gas planning about 600 miles and Niagara Hudson Power units now working on the last 200 miles of an 800-mile budget. A new system of street lighting for Binghamton will greatly increase illumination, especially on secondary streets.

An encouraging feature in utility operation is the increase in industrial power use over preceding weeks. Fall buying in many lines has been greater than had been expected, with the result that mills have been forced to speed production. Textiles are operating on two shifts with orders sufficient to maintain production schedules.

Electrical manufacturing operations for the first six months were well under last year. Some expansion is seen in the fall. Appliances and lighting installations continue to draw attention from buyers. The National Salesmen's Crusade has pepped appliance sales, with expanded campaigns planned by many utilities and retail outlets.

Strength in the securities markets has revived hopes for expanded new financing. Utility issues have been well received.

CHICAGO

There was further evidence last week that business was improving. A majority of electrical manufacturers reported a slight increase in orders over the previous week, and despite the approach of the usual midsummer dullness, the outlook is highly favorable. Although no significant change has occurred in industrial operations, sentiment is vastly improved and plans are being made for early expansion. In addition, government spending is having its effect as each succeeding week shows more projects getting under way.

Utility buying is still more or less under wraps, with purchases limited to necessary material. Some improvement has been noted in the smaller cities throughout the area, where plans are going forward for construction of new or additional generating facilities. The demand for air conditioning is increasing, the number of installations last month exceeding that of June, 1937. Outdoor lighting is fairly active and considerable work is being done in stores, theaters and restaurants.

Retail trade showed an increase for the third consecutive week. Sales of home furnishings at the summer market were approximately double those at the January show. Compared with the market a year ago, sales averaged 15 per cent less. Residential construction has picked up sharply during the past few weeks and now stands close to the level a year ago at this time.

REA Funds Allotted; New Contracts Let

Among the recent allotments made by the Rural Electrification Administration are the following:

GEORGIA—Carroll Rural Electric Association, $110,000 to build 114 miles of line, 616 customers in Paulding, Haralson, Heard and Carroll Counties. Walton Electric Membership Corporation, $237,000 to build 237 miles of line, 703 customers in Walton, Morgan, Gwinnett, Oconee, Rockdale and Newton counties. Mitchell County Electric Membership Corporation, $251,000 to build 259 miles of line, 1,271 customers in Mitchell, Dougherty, Worth, Decatur and Turner Counties. Jefferson County Electric Membership Corporation, $141,000 to build 160 miles of lines, 758 customers in Jefferson, Glascock, Washington, Burcke, McDuffie, Warren and Richmond counties.

INDIANA—Warren County Rural Electric Membership Corporation, $290,000 to build 290 miles of line, 570 customers in Warren, Benton and Tippecanoe counties. Rush County Rural Electric Membership Corporation, $223,000 to build 223 miles of line, 670 customers in Rush, Fayette, Henry, Hancock, Shelby and Decatur counties. Bartholomew County Rural Electric Membership Corporation, $165,000 to build 165 miles of line, 495 customers in Bartholomew, Jackson and Jennings counties. Fulton County Rural Electric Membership Corporation, $166,000 to build 166 miles of line, 500 customers in Fulton, Fayette, Hancock, Henry, Rush and Shelby counties. LaGrange County Rural Electric Membership Corporation, $218,500 to build 219 miles of line, 657 customers in LaGrange County. Parke County Rural Electric Membership Corporation, $267,000 to build 267 miles of line, 800 customers in Parke, Putnam, Clay and Vigo counties. Noble County Rural Electric Membership Corporation, $265,000 to build 265 miles of line, 795 customers in Noble, DeKalb, Elkhart, LaGrange, Steuben and Kosciusko counties. Kosciusko County Rural Electric Membership Corporation, $367,000 to build 367 miles of line, 1,000 customers in Kosciusko and Wabash counties. Jackson County Rural Electric Membership Corporation, $200,256, to build 202 miles of line, 940 customers in Jackson, Jennings and Washington counties.

Construction contracts:

MICHIGAN—Tri-County Electric Cooperative, Eaton Rapids, contract to Ulen Contracting Corporation, Lebanon, Ind., for building the second section of the project consisting of 140 miles of line, $121,605.

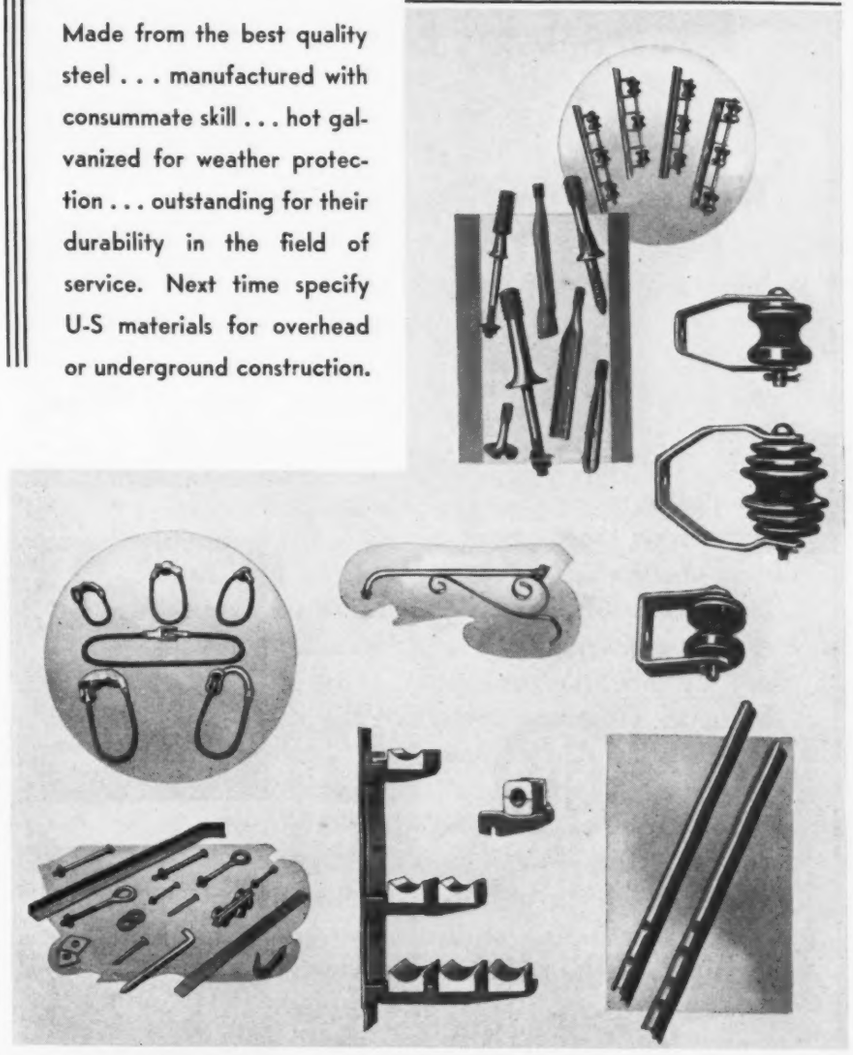
MISSOURI—Barton County Electric Cooperative, Lamar, contract to Cook-O'Brien Construction Company, Kansas City, for building entire project consisting of 196 miles of line, $126,268. Ozark Electric Cooperative, Mt. Vernon, contract to Williams Bros. and Haas, Inc., Chicago, Ill., for building first section of project, consisting of 137 miles of line, $106,814. Scott-New Madrid-Mississippi Cooperative Association, Sikeston, contract to the Stuart C. Irby Company, Jackson, Miss., for building entire project, consisting of 176 miles of line, 589 customers, $130,104.

OKLAHOMA—Consumers Rural Electric Company, Kingfisher, contract to Mattison-Wallack & Company, Britton, Okla., for constructing second section of project, consisting of 212 miles of line, 500 customers.

UTILITIES SERVICE

POLE LINE MATERIALS

Made from the best quality steel . . . manufactured with consummate skill . . . hot galvanized for weather protection . . . outstanding for their durability in the field of service. Next time specify U-S materials for overhead or underground construction.



Catalog No. 37 Lists The U-S Line of DISTRIBUTION . . . TRANSMISSION . . . UNDERGROUND AND STREET LIGHTING EQUIPMENT

UTILITIES SERVICE CO.

ALLENTOWN PENNA.

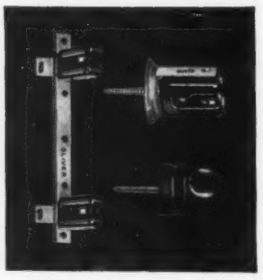
OLIVER

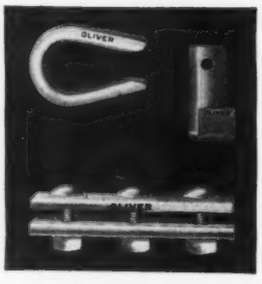
Pole Line Material

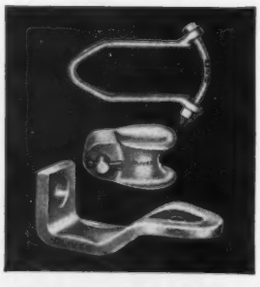
PERFECTED PRODUCTS OF OVER FORTY YEARS OF ENGINEERING AND RESEARCH

DOUBLY PROTECTED *against* WEATHER EXPOSURE

Maximum protection against the constant attacks of the elements is assured by the double-thick coating of zinc spelter applied by the Oliver Special Hot Galvanizing Process. That is why Oliver has been a standard specification among economy-minded transmission line engineers for more than 40 years . . . why Oliver Pole Line Materials deliver the maximum service per dollar invested.







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PITTSBURGH · PENNSYLVANIA

OLIVER POLE LINE MATERIALS

APPROVED AND ACCEPTED SINCE 1894

OLIVER

Sales Opportunities

SAN FRANCISCO, CALIF.—Pacific Gas & Electric Company has filed plans for new one-story indoor power substation at West terminal of Key System fill and will proceed with construction at once. Cost over $75,000 with transformers, switchgear and accessory equipment.

CHARLESTON, S. C.—South Carolina Public Service Authority, Charleston, Burnet R. Maybank, chairman, has engaged Harza Engineering Company, 205 West Wacker Drive, Chicago, Ill., consulting engineer, to make surveys, plans and specifications, and supervise construction of proposed power and navigation project on Santee and Cooper Rivers. A main power dam will be located in vicinity of Wilson Landing, with construction scheduled to begin late in fall. Project will include a hydro-electric power plant, power substations and switching stations, transmission and distributing lines. Bids for different features of work will be asked in near future. Entire development is estimated to cost $37,500,000. An initial fund of $6,000,000 has been secured through federal aid and remainder of cost will be obtained through same source. F. R. Sweeny, Anderson, S. C., is chief engineer for Authority.

VANDALIA, MO.—Has engaged W. A. Fuller Company, 2916 Shanandoah Avenue, St. Louis, Mo., consulting engineer, to make surveys and prepare plans for a municipal electric power plant. Cost estimated at $165,000. Financing will be arranged through federal aid.

PULASKI, TENN.—Is concluding an agreement with Tennessee Valley Authority, Knoxville, Tenn., for construction of about 50 miles of distributing lines in Pisgah and Stella districts, Giles County, for extensions in service for rural consumers. Cost close to $65,000. Line construction will be carried out by TVA.

ABERDEEN, MISS.—Receives bids until July 22 for municipal electric distributing system, covering part of municipal installation for use of TVA power (Contract No. 1). Cost estimated about $105,000. Beard Engineering Company, 2606 Oakview Terrace, St. Louis, Mo., is consulting engineer.

EL CENTRO, CALIF.—Imperial Irrigation District, El Centro, has secured permission from City Planning Commission to construct and operate an indoor power substation in vicinity of Orange and Third Streets. Work scheduled to begin soon. Cost close to $90,000 with transformers, switchgear, line connections, etc. M. J. Dowd is chief engineer of district.

FRANKLIN, TENN.—Chemical Division, Tennessee Valley Authority, Knoxville, Tenn., plans installation of motors and controls, regulators, conveyors and other equipment in new phosphate plant for commercial fertilizer purposes in vicinity of Franklin. All machinery will be electric-operated. A power substation will be built for connection with transmission line of TVA for power supply. Fund of about $500,000 is being arranged for entire project.

BATAVIA, ILL.—Plans electrification of municipal pumping stations for water system, including new municipal electric power plant for power supply. Wells Engineering Company, Geneva, Ill., consulting engineer, has been engaged to make surveys and estimates of cost.

WASHINGTON, D. C.—Food and Drug Ad-

ministration, Department of Agriculture, Washington, plans installation of motors and controls, regulators, conveyors and other equipment in new laboratory for pharmacology and vitamin work. Fund of $650,000 has been appropriated for project. Proposed to begin construction soon.

CHATTANOOGA, TENN.—Chattanooga Electric Power Board is arranging early call for bids for transformers, switchgear and accessory equipment for distribution substations (Contract No. 3-E). Cost estimated about $60,000. Also for overhead feeder lines for service for consumers in certain areas (Contract No. 5). Estimated cost about $60,000. R. G. Finley is chief engineer for board.

SIBLEY, IOWA—Plans extensions and improvements in power plant, including installation of additional equipment for increased capacity. Cost about $151,000. Financing is being arranged through federal aid. Burlingame, Hitchcock & Estabrook, Minneapolis, Minn., are consulting engineers.

DENVER, COLO.—Bureau of Reclamation, Denver, receives bids until July 20 for radio telephone equipment, including transmitters, receivers, one gasoline engine-driven alternator and accessory apparatus, for use on Yakima project, Wash. All equipment will be installed by Government. (Specifications 1096-D).

CANTON, OHIO—Timken Foundation, Canton, plans installation of motors and controls, conveyors, regulators and other equipment in new multi-story vocational high school on site near city, for which superstructure will begin soon. Cost about $1,000,000. Charles E. Firestone, 1324 Cleveland Avenue, N. W., Canton, is architect.

CORBIN, KY.—Has plans under way for expansion and improvements in municipal electric power plant, including installation of additional equipment for increased capacity. Fund of $350,000 is being arranged through Federal aid for this and municipal waterworks extensions. Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., are consulting engineers.

BOSTON, MASS.—Bureau of Yards and Docks, Navy Department, Washington, will prepare plans for extensions and improvements in power plant at Boston Navy Yard, with installation of additional equipment. Cost about $110,000. Also, will extend and improve electric circuits in shops at same yard, at cost of about $75,000. Bids will be asked at early date. Appropriations have been authorized in amounts noted.

EDINBURG, TEX.—Spreckles Sugar Company, 2 Pine Street, San Francisco, Calif., plans installation of motors and controls, conveyors, regulators, electric hoists and other equipment in proposed new beet sugar mill near Edinburg, where site is being selected. A power house and pumping station will be built. Cost over $1,000,000.

DENVER, COLO.—Bureau of Reclamation, Denver, has secured an appropriation of $1,000,000 for new Elephant Butte hydroelectric power plant, on Rio Grande River, Rio Grande Project, New Mexico-Texas, and will proceed with plans at early date.

NEWPORT, R. I.—Bureau of Yards and Docks, Navy Department, Washington, D. C., will prepare plans for extensions and improvements in power plant at torpedo station, Newport. Appropriation of $300,000 has been authorized for project.

INSULATION HEADQUARTERS

Where the use of

CONTINENTAL-DIAMOND PRODUCTS

helped I-T-E Engineers to simplify and improve mechanical and insulating features

Illustrated here is a unit for the widely used I-T-E Multumite Switchboard. Arrow (A) indicates the cam which operates the circuit breaker, manually. Originally this cam was made up of an expensive assembly of metal and insulation. Redesigned with the aid of Continental-Diamond Engineers, it is now a simple molded CELORON unit of adequate mechanical strength and high insulation properties - - - another instance of improvement with economy. A further use for DILECTO insulation, where a combination of high mechanical strength and electrical properties is required is the connector bar of the circuit breaker. Arrow (B) illustrates this type of insulation as furnished by Continental-Diamond Fibre Company.

CONTINENTAL-DIAMOND FIBRE CO.

Newark, Delaware

Represented in Canada by DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO

• Wood Pole Structure for 6600 v distribution system forming a turn of ninety degrees.

• Steel Switching Tower erected at Fort Peck, Montana.

EXPERTS ON NEW CONSTRUCTION *Under all kinds of conditions*

A. S. SCHULMAN ELECTRIC COMPANY
537 S. Dearborn Street
CHICAGO, ILL.
FOUNDED 1890

• The Schulman organization of erection specialists has had more than 50 years of experience in power line rehabilitation and construction projects. Trained crews and modern equipment for low-cost construction, in the quickest time, are immediately available. Let us submit quotations and consult with you on your next requirements.

STEEL TOWER · · · WOOD POLE LINE CONSTRUCTION
SWITCHING STRUCTURES · SUBSTATIONS · POWER HOUSES

"DIXIE" POLES

PILING, TIMBERS AND CONSTRUCTION LUMBER

Produced from dense longleaf yellow pine. Properly seasoned and graded. Uniformly straight and strong. Available untreated or pressure-treated either with Creosote or "WOLMAN SALTS" preservative. Prompt deliveries.

JACKSON LUMBER COMPANY
LOCKHART, ALABAMA
A CROSSETT WATZEK GATES INDUSTRY

Municipal Plants

GLENDALE, CALIF.—Threat of injunction proceedings has cast its shadow on the program of Glendale to build its recently authorized $1,500,000 municipal steam-electric generating plant. D. C. Lantz, president of the Glendale Industrial Association, said fourteen business men had indicated their intention to enjoin construction unless competent engineering experts were called in to study the generating plan before a definite program was adopted.

PLUMAS COUNTY, CALIF.—Dissolution of Bidwell Municipal Utility District, embracing most of Plumas County, was voted in a special election June 28. Unofficial count was 3,033 to 2,465. Organized three years ago, the district was to function as an electric utility in territory already served by Pacific Gas & Electric Company. Dissolution was proposed on the grounds that although taxes had been levied directors had made no progress toward building or buying a distribution system. A small rural majority favored retention, but the vote in Chico, largest city involved, was more than enough to offset this.

BOONVILLE, IND.—Judge Ralph E. Roberts of the Spencer Circuit Court has been named special judge in the Warrick Circuit Court to preside in the condemnation suit of this city against the Southern Indiana Gas & Electric Company, operating an electric plant in Boonville. In a special election held more than a year ago citizens voted to purchase the Southern Indiana Gas & Electric Company's lighting plant and to convert it into a municipal plant. Judge Union W. Youngblood, regular judge in the local court, vacated the bench in the case, stating that he is a citizen and a taxpayer, an interested party in the litigation, also a patron of the Southern Indiana Gas & Electric Company and therefore is a financially interested party. Special Judge Roberts has announced October 3 as the date for starting the hearing. Since the special election officers of the utility have refused the offers of the city for the purchase of the plant on the grounds that the sum offered was not sufficient.

STORM LAKE, IOWA—For the third time in the past year the city voted on a power question and in the last election the Iowa Public Service City won a ten-year franchise in a close vote of 1,271 for the franchise and 1,213 opposed. The company's present franchise expires August 25.

BELMOND, IOWA—This city recently defeated a proposed bond issue of $120,000 for a municipal light and power plant building and equipment.

DAYTON, IOWA—In a special election the city has voted to construct a $55,000 municipal power plant and PWA aid is to be sought for the project.

THAYER, MO.—For the first time in more than two months street lights in the city were turned on June 21, power coming from the new municipal plant, which started operation on that date. Thayer's street lights were shut off April 14, when construction of the municipal plant started, but the state Public Service Commission ordered the Arkansas-Missouri Power Company to resume service. City Council, however, adopted resolutions asking the company not to restore service for street lights and other city-owned property.

SHULLSBURG, WIS.—Wisconsin Public Service Commission has issued a final

certification of just compensation in the purchase of the electric property of the Interstate Light & Power Company, following payment into Lafayette County Circuit Court of $20,700 by the city. This sum represents $18,000 as the commission's 1936 valuation of real estate and equipment and $2,700 as the maximum amount for materials and supplies on hand and for additions of equipment made since the valuation.

SUPERIOR, WIS.—Wisconsin Public Service Commission has ruled that the city may acquire the properties of the Superior Water, Light & Power Company within four months at a cost of $4,050,000. The commission's new valuation set aside a price of $4,625,000, which it had fixed for acquisition purposes on August 13, 1937, and followed a rehearing last January. Superior voters have approved the purchase, but rejected the $4,625,000 price at an April referendum. The commission said that it lowered the valuation because the first price covered some non-operating property and other items not included in the new valuation.

WISCONSIN — Northwestern Wisconsin Electric Company has filed suit in Circuit Court in Madison for an order preventing the state Public Service Commission from reopening proceedings in an attempt to create a power district for Polk and Burnett county municipalities. The state Supreme Court several months ago ruled invalid an approval by the commission of the project because it had not been made within ten days after seven of the 28 communities in the district voted against it. Later, however, Attorney-General O. S. Loomis ruled that the ten-day period provided in the statutes is directory and not mandatory.

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Recent Rate Changes

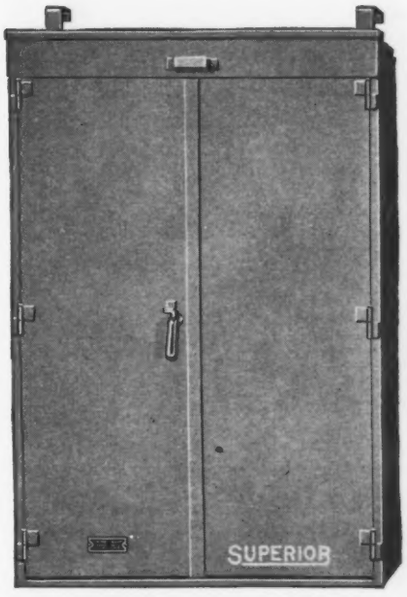
ROCHESTER GAS & ELECTRIC CORPORATION has filed revised rates with the New York Public Service Commissison which are estimated to save consumers of the company approximately $400,000 annually. The commission permitted the lower rates to become effective July 25. Recently the commission approved a recommendation of Commissioner Maurice C. Burritt that when the reduced rates were filed and made effective the present rate proceeding against the company would be closed. The reductions now filed apply chiefly to commercial and industrial rates against which complaints have been made. They will be reduced $326,500 annually and residential rates will be cut $72,300 annually.

BIRMINGHAM ELECTRIC COMPANY'S commercial customers will save approximately $150,000 if recommendations made to the Alabama Public Service Commission by its chief engineer, I. F. McDonnell, are put into effect. Following the submission of the report and recommendation of the engineer, the commission ordered a hearing for July 26 in Birmingham and issued a citation to the Birmingham Electric Company to appear before it at that time.

NEW JERSEY PUBLIC UTILITIES COMMISSION has ordered initiation of a formal rate case to force a reduction in the rates of the Jersey Central Power & Light Company. The case will be started in the fall. Announcement was made by President Bacharach of the commission, who stated that the decision to initiate the rate proceedings followed failure of the board to negotiate a reduction in rates through conferences with company officials.

WHY CARRY DUPLICATE INDOOR AND OUTDOOR INSTRUMENT TRANSFORMER STOCKS?

Use your indoor instrument transformers on either inside or outside jobs. House them in SUPERIOR Instrument Transformer Enclosures.



Cat. No. IT-324612 SUPERIOR Instrument Transformer enclosure for six transformers is 32″ wide, 46″ high, 13″ deep.

Three standard sizes — Special sizes too.

Just ask for Bulletin No. 377.
We'll carry the ball for you from there on.

Superior Switchboard & Devices Company

CANTON, OHIO

•Been at it Since 1920

SUPERIOR
REG. U. S. PAT. OFF.

Greenlee Hydraulic Tools for Bending and Pushing Pipe

Hydraulic Conduit and Pipe Benders

Much time and money can be saved by using Greenlee Hydraulic Tools for bending conduit and pipe. Not only do they do the work faster, but they make a better job of it with much less effort on the part of the workmen. They are simple to operate and easy to take to the job. No. 770, shown to the right, bends all sizes of conduit from 1¼" to 3". The larger size, No. 775, bends all sizes from 3" to 4½". Attachments can be furnished for thin-wall steel conduit.

Ask Now for COMPLETE DETAILS

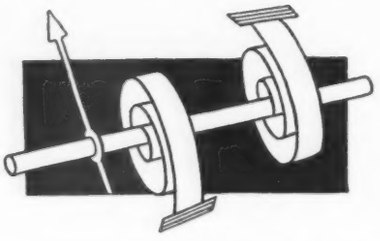
Hydraulic Pipe Pusher

With this hydraulic pusher, one man can stand in a comfortable position and send pipe under streets, sidewalks, lawns, etc., simply by pumping the handles. It saves money and makes it unnecessary to do extensive trenching. Because of its compact design and simple construction, it is easy to set up and move about. Capacity for pipe up to 4".

GREENLEE TOOL CO., 1705 Columbia Ave., ROCKFORD, ILL.

LINCOLN DEMAND METERS

ONLY ONE UNIT MOVES



The unit shown above consists of the center shaft, two bimetallic coils, and the pointer. This comprises the moving element of the Lincoln Maximum Demand Meter. The only motion is the slow expansion of the coils and the slow turning of the shaft.

TYPE WD

SEND FOR YOUR COPY OF CATALOG TO

LINCOLN METER COMPANY
SPRINGFIELD, ILLINOIS

Revamped Plant Gets Added Kw. at $90

[*Continued from page 38*]

hour. During a recent day's run a comparative test of the 2,000-kw. and the 1,000-kw. turbo-generator units gave an output of 10,000 kw.-hr. with 48,900 lb. of steam produced by 12 tons of coal for the new larger unit and a corresponding output of 8,000 kw.-hr. from 54,500 lb. of steam with a consumption of 14⅓ tons of fuel for the smaller unit; a production of 2,000 kw.-hr. more current with 5,600 lb. less of steam, at a saving of 2⅓ tons of coal. With low volatile nut and slack coal at $4.50 per ton at the plant the daily savings in the use of the new generating equipment would be $10.50, or a monthly economy of $315.

Contracts for the electrical and steam equipments were awarded in January, 1937, on the basis of competitive bids, to the Westinghouse Electric & Manufacturing Company and the Edgemoor Iron Works, respectively. Additions to the steam plant building and foundations for the equipment were built by local labor under the immediate supervision of the engineer representatives—Erney Spangler and Harry W. Goldthwaite of The Research Service, Washington, D. C. The new spray pond and pump house was built by Fred K. Betts, local contractor. The power piping system was installed by W. S. Moffett, engineer and contractor, Staunton, Va., and the installation done by D. Claude Bowman, Harrisonburg, Va. The entire project was carried out under the general direction of the writer and the Harrisonburg Electric Department—John F. Noll, superintendent; D. W. Thomas, chairman, and J. O. Stickley and Morris Spiro.

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Porcelain Enamel Forum

Plans for the third annual Porcelain Enamel Institute Forum, to be held October 12-14 in Chicago, are progressing rapidly, according to F. E. Hodek, Jr., General Porcelain Enameling & Manufacturing Company, chairman of the committee.

Discussion of the problems of the industry, review of new developments during the past two years, the possibilities of using automatic machines in various enameling operations are subjects to be featured at the meeting.

Balancer Reduces Dips on Four-Wire Secondary

[*Continued from page 41*]

the wye-delta with floating delta and the zigzag. They were tried out in a field installation using a bank of three 5-kva. distribution transformers with the primary windings disconnected and the 120-volt windings acting as one-to-one ratio balancers. Each transformer had a reactance of 1.9 per cent at 2.5 kva. Both connections were found to cut motor dips 30-50 per cent as read on graphic voltmeters and 25-30 per cent by indicating meters and a test motor.

Pole-mounted unit adopted

The results were satisfactory enough to warrant the purchase of a unit more suitable for pole mounting on a residential street. A standard 7.5-kva., three-phase, 120-volt to 120-volt transformer was found to be available having a reactance of 1.0 per cent.

The wye-delta connection was adopted because of its simplicity. This was installed permanently and has given a satisfactory performance. The balancing transformer was installed at the end of the secondary of Fig. 1. A fuse box is installed in the leads to provide short-circuit protection. Graphic voltmeter charts (Fig. 2) taken at the last pole before and after the installation of the balancer show that voltage dips have been cut to about 1½ volts, and considerable correction for unbalance is noticeable.

Calculated results for various-sized balancing transformers with a 20-amp., 50 per cent power factor, 120-volt load applied phase to neutral at various points along a 350-ft. and a 700-ft. secondary are shown in Fig. 3. It will be seen that a 7.5-kva. transformer will cut the voltage dips as much as 50 per cent. Conversely, with an allowable dip of two to three volts, about twice the length of secondary can be served satisfactorily with a balancing transformer.

Flows of current in the 700-ft. secondary (Fig. 4) were calculated with the assumed load applied at (a) the center and (b) the far end of the secondary. Possible current flow between customers' ground connections was neglected in these computations.

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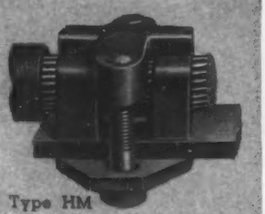

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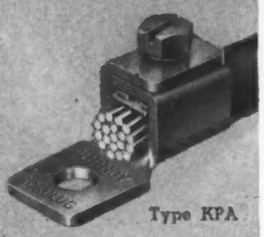

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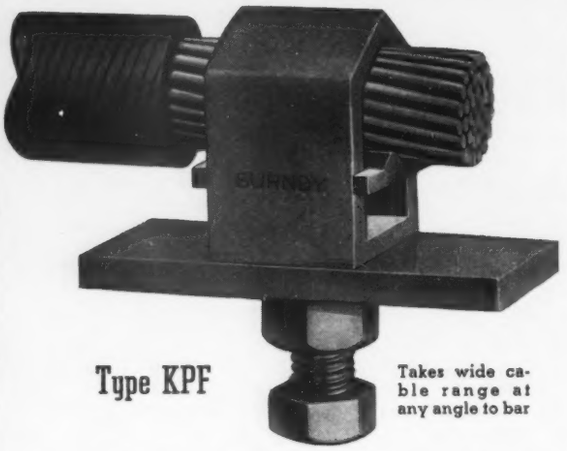

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BOOK REVIEWS

College Physics

By Henry A. Perkins. Published by Prentice-Hall, Inc., New York. 808 pages, illustrated. Price, $3.75.

College texts are not generally rated as self-help books, but occasionally a professor-author is as earnestly solicitous in type with his readers as he is vocally for the surefooted step-by-step progress of his classes. Then the result is a treatment geared to the absorptive rate of the student. This book reflects exactly that flavor of professional earnestness and in admirably balanced manner. It adheres consistently to the philosophy that where sustained intellectual absorption is imperiled by rough going, there is the terrain to apply pause and sustenance.

The author has taught a generation of students in an academic atmosphere tempered with a regard for the utilitarian potentialities of science and that flavor enlivens the treatment. Into his writing he has infused both the pedagogical technique which he has found successful and the homely illustrations which catch the eye and ear of those who invade the field of real physics from preparatory schools that are as various in objective and attainment as in name and geography. To all these attributes of personalized impartation of principles the author has added a unique infusion of the pioneering discoveries without diverting attention from the recent ones which have modernized physics.

The practicing engineer will envy the son who is directed to equip himself with this text when he discovers how painstakingly it deals with items he accepted on faith but found later he really never understood fully. Further, the old timers will understand if it be said that "Perkins" is "Ganot" expurgated, explicated, extricated and extended in the forward sense. Almost needless to say, the book supplements the orthodox divisions of the subject by chapters on thermo- and photoelectric emission, X-rays and related phenomena, atomic structure and radioactivity.

•

Electric Range Sales Letters

By Edmund A. Schilling. Published by Kollin Publishing Company, State Bank Building, Milwaukee, Wis. 39 pages. Price per single copy $1.35 postpaid, but electric range distributors offered quantity price of 80 cents each.

This is a series of 35 letters designed to promote and sell electric ranges to the ultimate user. The letters embrace those needed for general prospects for announcing cooking schools, letters to husbands, to prospective purchasers, to builders, and other elements which are of influence in consummating the sale to the ultimate user.

The book is designed for use by a utility company in its own retail sales department for the sale of domestic ranges and may be used with equal facility by dealers for the same purpose.

Greatest value of this book probably arises from the fact that letters can be used to sell the prospect in advance on some of the advantages of electric cookery to the end that there will be increased

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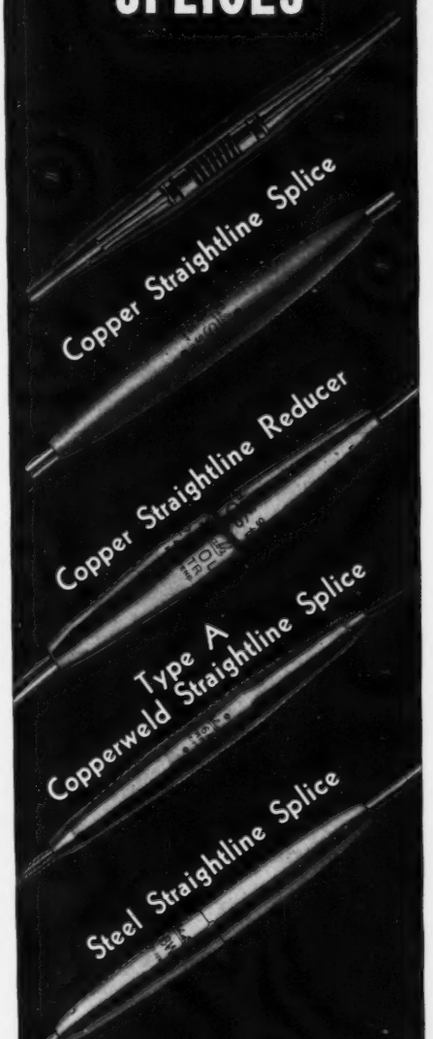

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leads for salesmen, a reduction in the time and expense of canvassing and a subsequent reduction in cost of sales.

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Artificial Light and Its Applications

Published by Westinghouse Lamp Division, Westinghouse Electric & Manufacturing Company, Bloomfield, N. J. 258 mimeographed pages, illustrated. Price, 75 cents.

Prompted by the rapid advances in lighting during the past two years, this company has prepared a completely revised edition of its lighting handbook. Where the earlier edition had had but seven chapters, this new one has nineteen, some of which are new, others of which are elaborations. New chapters include those on photometry, color, theater lighting and sports and recreational lighting. As before, industrial, school, commercial and public building, display, street and highway, farm and home lighting principles and practices are discussed and pictured. The book should prove equally useful as a textbook for the beginner and a reference for the lighting engineer.

•

Metal Statistics, 1938

By B. E. V. Luty and N. J. Langor, editors. Published by American Metal Market, 111 John Street, New York 600 pages, 6 x 4 inches. Price, $2 per copy.

This is the 31st annual edition of a well-known statistical reference book on iron, steel, non-ferrous metal, fuel and miscellaneous economic subjects. As usual, the book contains a wealth of information in handy reference form and furnishes copious data on production, consumption, imports, exports, stocks, price fluctuations and averages (monthly and annually) together with data on a varied assortment of economic subjects. The publishers have again made numerous useful additions and improvements, thus making the book increasingly valuable and indispensable to all who have occasion to refer to statistics relating to the steel and metal industries.

•

Sprinkle's Conversion Formulas

By Leland W. Sprinkle. Published by P. Blakiston's Son & Company, Inc. 122 pages. Price, $1.25.

More than 200 unit quantities are here set up in most convenient form of conversion to other equally significant ways of expressing the same quantity. It is not confined to scientific and engineering units which are typified by ergs per second, grams per cubic centimeter, pounds per cubic yard. In addition there are proportionalities for fathoms and furlongs, cords, tablespoons, reams, knots. These inclusions, plus the comfortable size (3x6) and tvpe format, make the little book one that will avoid much searching through many fat handbooks.

•

Strom- und Spannungswandler

(*Current and Potential Transformers*)

By Michael Walter. Published by R. Oldenbourg, Munich, Germany. 159 pages, illustrations. Price, 8.80 reichsmarks.

The presentation of material in this book was prepared primarily, according to the preface, as a guide for plant-designing and operating engineers in the selection, application and testing of transformers for instruments, meters and relays, based on the

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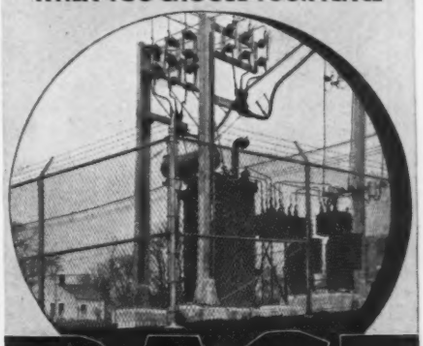

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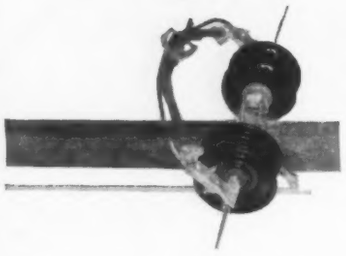

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author's experience with relay-operated protective devices.

Very moderate use is made of mathematics; the treatment takes the form of a discussion of the principles of operation, general construction and considerations regarding installation and use; for example, provisions to guard against thermal or mechanical failure on overload or short circuit. The text is accompanied by numerous well-drawn diagrams, oscillograms and halftone illustrations taken from present German practice.

●

Inventions and Their Protection

By George V. Woodling. Published by the Penton Publishing Company, Cleveland, Ohio. 316 pages, illustrated. Price, $5.

Written by an author with an E.E. as well as a law degree, this book succeeds well in its aim to show the inventor what constitutes a worth-while patentable invention and how to get maximum protection during and after the issuance of the patent papers. Many sample exchanges of letters between attorney and client, along with sample claims and follow-through of exemplary cases, serve to make forceful the precepts enunciated in the text. There are also sample forms of assignment of mutual protection of employer and inventive employee. Hints on confidential disclosure are another significant item that give practicality to a book that otherwise would be didactic and legalistic. Design patents and trademarks are treated in two closing chapters. While no book can be a complete substitute for an attorney, this one does much to fortify the innocent inventor in his dealings with the patent office, with assignees, with infringers and plain chiselers.

●

Export and Import Practice

Trade Promotion Series No. 175, prepared by F. R. Eldridge and other officials of the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, Washington D. C. 300 pages, indexed. Price, 40 cents.

This authentic foreign trade manual is designed to educate persons entering the foreign trade field as well as to serve as a reference for those previously acquainted with the practices and the aid obtainable from the bureau. In the first part, devoted to export practice, getting the order, preparing and shipping it and receiving payment are discussed in turn. The second part, treating of import practice, covers the import purchase, the import shipment and selling the American market. Forms and sales agreements likely to be met with in foreign trade are reproduced. Major factors to be considered in a market study are outlined rather completely in the appendix, which also carries a glossary of commercial abbreviations.

●

Elektrische Oefen

(Electric Furnaces)

By Adolph Bräuer and Josef Reitstötter. Fifth and sixth issues. Complete series (in six issues) 656 pages. Price, bound, 172 reichsmarks. Single issues, unbound, 27 reichsmarks.

The sixth is the final issue of a series of brochures tracing the development of electric furnaces as indicated by patent records. Reference was made in ELECTRICAL WORLD to earlier issues. The complete set, which will constitute a volume of more than 650 large pages and which was prepared with

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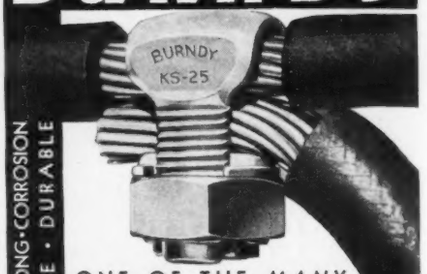

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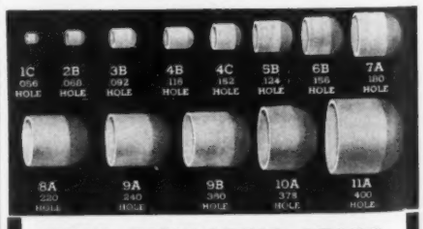

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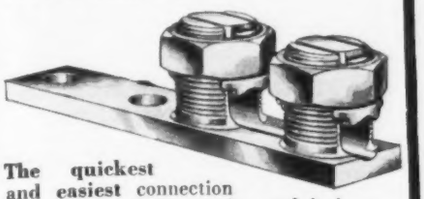

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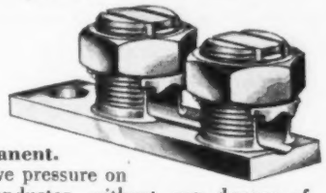

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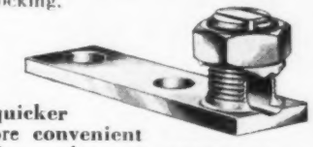

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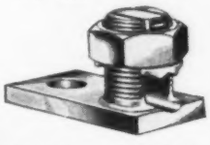

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the co-operation of a staff of distinguished authorities should be of especial value for reference to patent specialists, inventors and others concerned with the development and applications of the electric furnace. The treatment comprises textual commentaries and full descriptions of German patents, together with notes on others granted in Great Britain and the United States. All kinds of electric industrial and laboratory furnaces have been considered.

•

Engineering Electronics

By Donald G. Fink. Published by McGraw-Hill Book Company, 330 West 42d Street, New York, N. Y. 358 pages, illustrated. Price, $3.50.

For the practicing engineer or student whose grounding in electricity is fundamental this work offers a not-to-be-neglected opportunity to acquire a working knowledge of electronics, electronic tube applications and circuit design that will fit him to solve fundamental engineering problems of tube use.

Three major divisions mark the book: (1) Physical electronics, (2) electron tubes, (3) electron tube applications. In part 1 the fundamental physical properties of electrons are correlated with their emission and control in vacuum and gases. Part 2 relates the physical behavior of electrons in a vacuum and in gases to the characteristics of the modern electron tube and shows how these characteristics are modified by tube design. This section covers thermionic vacuum tubes, gas-filled thermionic tubes, photosensitive tubes and cells, electronic sources of light and specialized electronic tubes. After refreshing the memory of the reader on the fundamentals of circuit theory the author, in part 3, takes up the application of electronic tubes to power transmission, communication, industrial control and measurement circuits.

Throughout the text the author has struck a fine balance between simplicity of description and elaborate technicalities. Nowhere does the material presented exceed the understanding of the average engineering junior or senior. Although mathematical treatment of this subject can become most complex, treatment has been here limited to the scope of algebra and trigonometry with but a few necessary exceptions. The work is replete with charts, tables and diagrams which add greatly to the formation of concepts of electron action under different tube conditions. The specific tube characteristic curves and reference tables, included, make the book an excellent reference for those who have only occasional need for designing electronic tube circuits. The practical side of the subject has been developed in a series of type problems and solutions showing the method of solution of the more typical electronic circuit application problems.

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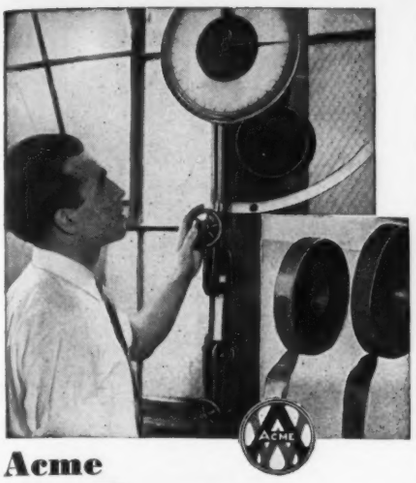

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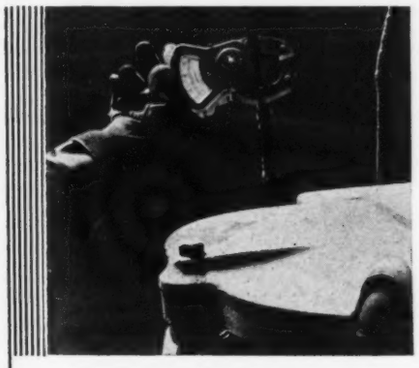

How Do YOUR Men Measure Current?

Checking the current in cables, transformers, etc. can take a long time but it's a five seconds job for a lineman with a Tong Test Ammeter. With it, A.C. or D.C. can be measured accurately and safely without breaking the circuit or insulation.

Tong Test requires no auxiliary equipment and is available in ranges up to 800 amperes. Because of its compactness and light weight (2¾ pounds) your men can safely use it with equal efficiency on poles, underground or on the surface. Write us for prices and a complete description of this remarkable instrument.

The Voltor attachment used with the Tong Test, measures voltages accurately.

COLUMBIA ELECTRIC MFG. CO.
4529 Hamilton Ave., Cleveland, Ohio

TONG TEST AMMETERS

Offers R.F.D. Refrigerator

Crosley Radio Corporation has added to its line of electric refrigerators a new low-cost model of six cubic feet capacity to sell delivered and installed for less than $100. New model was designed especially for rural and low-income groups requiring large food storage space at moderate cost and will be called the "R.F.D. Special."

•

Plan Addition to Navy Yard

Bureau of Yards and Docks, Navy Department, Washington, D. C., is preparing plans for a one-story addition to the electric equipment manufacturing building at Portsmouth, N. H., Navy Yard, for which an appropriation of $90,000 has been authorized. Electric power plant at this yard will also be enlarged and improved; $100,000 has been appropriated for this purpose.

•

Lists Westinghouse Stock

Board of governors of the Chicago Stock Exchange has approved the application of the Westinghouse Electric & Manufacturing Company to list 79,974 shares of 7 per cent cumulative participating preferred stock, par value $50 a share, and 2,592,155 shares of common stock, par value $50 a share.

•

Washer-Ironer Week

National Washer-Ironer Week has been set for October 23-29 by the American Washing Machine Manufacturers' Association, according to J. R. Bohnen, executive secretary. A goal has been set of double the normal washer-ironer retail sales for each participant.

•

Find New Use for Washer

Gimbel Manufacturing Company, largest maker of potato chips in San Antonio, Tex., uses a General Electric spin-basket type washer for extracting water from potato slices before cooking them into chips.

•

Organizes Repair Service

The General Time Service has been organized in Milwaukee, Wis., to engage in repairing and reconditioning time equipment requiring the actual fabrication of obsolete parts, wheels, pinions, gears, etc. The company is also especially equipped to repair any type of modern instruments used in specialized industrial applications.

A GRIP FOR ALL NEEDS

No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to ½ in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

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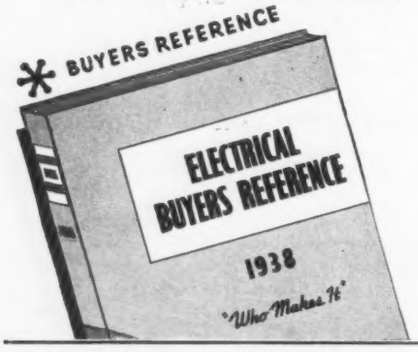
● **YOU, TOO, can save time and money in your buying by making it a habit to look FIRST in Electrical Buyers Reference—because it is the most complete book of its kind.**



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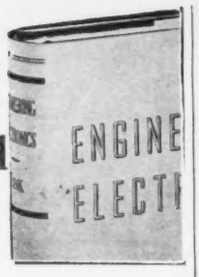

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